

付 表

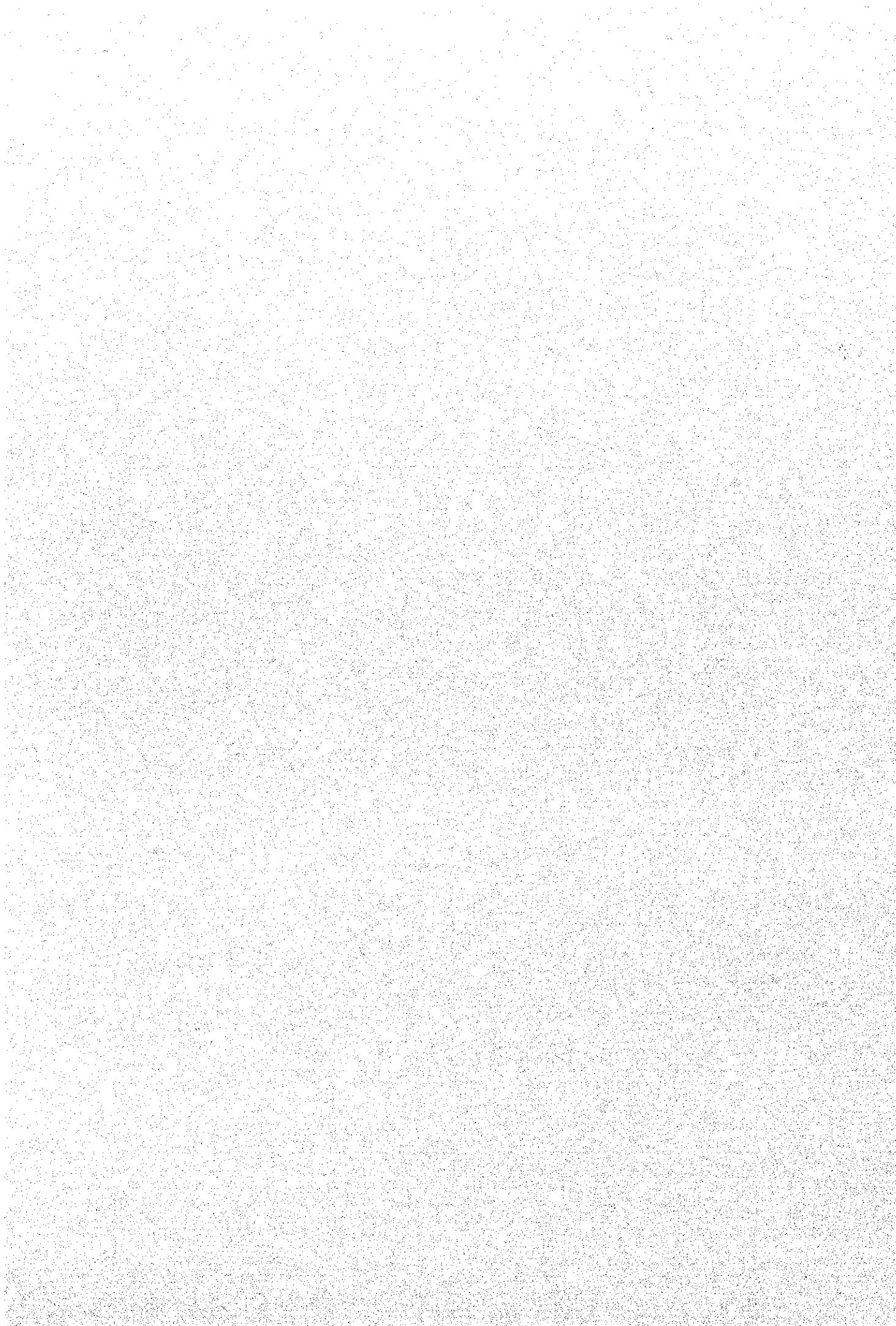


表 1.5.1 JICA調査団及びカウンターパート名簿

POSITION	JICA STUDY TEAM	COUNTERPART
1. Team Leader	Mr. Takeshi Kawaguchi	Mr. A. Dube (Agritex, Midlands P.O) Mr. P. Murwisi (Agritex, Mashonaland West P.O)
2. Dam Engineer	Mr. Yuji Murase	Mr. T. C. Kabell (DWD, Central office)
3. Agriculture	Mr. Hisashi Ikewada	Ms. E. R. Ndoro (Agritex, Kadoma District Office) Mr. E. Makaza (Agritex, Mashonaland West P.O)
4. Irrigation and Drainage/ Water Management	Mr. Inder Mohan	Mr. B. Mubayi (Agritex, Chegutu District Office) Mr. L. Tirivamwe (Agritex, Mashonaland West P.O)
5. Environment	Mr. Julian Bertlin	Mr. S. Muvhunzi (Agritex, Mashonaland West P.O)
6. Social Environment	Mr. Shusuke Minato	Ms. M. Chimbira (Agritex, Central Office)
7. Rural Society/Extension	Mr. Makoto Ishizuka Mr. Takashi Shiraki	Mr. I. Pilime (Agritex, Midlands P.O)
8. Agro-economy/Marketing	Mr. Guy Motha	Ms. E. R. Ndoro (Agritex, Kadoma District Office) Mr. E. Makaza (Agritex, Mashonaland West P.O)
9. Livestock	Mr. Augus Robert Maclaurin	Mr. J. Muwunganirwa (Agritex, Midlands P.O)
10. Rural Infrastructure	Mr. Tatsumi Tanabe	Mr. P. Murwisi (Agritex, Mashonaland West P.O) Mr. L. Tirivamwe (Agritex, Mashonaland West P.O)
11. Soil Mechanics/Geology	Mr. Kenji Yano	Mr. T. C. Kabell (DWD, Central Office)
12. Structure Design/Cost Estimation	Mr. Yutaka Niikawa	Mr. T. C. Kabell (DWD, Central Office)
13. Project Cost Estimation/ Evaluation	Mr. Badri Nath Adhikary	Mr. D. Towonezvi (Agritex, Central Office)
14. Supervise for Aerial Photo Mapping	Mr. Takehiko Hirano	Mr. Kudzerema (Agritex, Mashonaland West P.O)
15. Supervise for Canal Route Survey	Mr. Ryousuke Itoh	—

表 3.1.1 平均月気象データ

Name of Station : Kadoma

Description	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Average Rainfall (mm)	184.7	128.0	86.7	27.7	6.8	1.5	0.3	1.2	8.3	35.0	90.8	164.4	735.4
Air Temperature													
- Max. (°C)	28.6	28.4	28.9	28.1	26.4	24.1	24.0	26.7	30.4	32.0	30.7	29.0	28.1
- Min. (°C)	17.7	17.3	16.3	14.5	11.4	8.8	8.5	10.3	13.8	16.8	17.6	17.8	14.2
Relative Humidity (%)	-	-	-	-	-	-	-	-	-	-	-	-	-
Pan Evaporation (mm)	5.5	5.2	5.5	5.3	4.9	4.5	4.8	6.3	8.4	9.0	7.6	5.8	6.1
Wind Speed (km/hr)	176.6	162.4	172.0	193.5	194.2	212.5	226.9	246.2	264.9	276.2	244.2	204.0	214.5
Sunshine Hour (hrs)	7.2	7.3	8.3	8.9	9.2	9.2	9.4	10.0	9.9	9.1	7.5	6.6	8.6

Note : Data for relative humidity are not available.

Name of Station : Gokwe

Description	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Average Rainfall (mm)	182.1	158.7	76.3	34.4	5.9	1.1	0.2	0.7	3.5	26.3	85.2	160.4	734.8
Air Temperature													
- Max. (°C)	27.3	27.1	27.6	26.8	25.0	22.8	22.6	25.3	29.0	30.2	29.4	27.6	26.7
- Min. (°C)	17.7	17.4	17.0	15.1	12.0	9.3	8.9	11.4	15.2	17.6	18.0	17.6	14.8
Relative Humidity (%)	74.0	72.1	67.3	59.3	53.4	50.5	48.5	41.4	37.0	41.6	51.7	68.5	55.4
Pan Evaporation (mm)	5.5	5.5	5.8	5.6	5.1	4.6	4.9	6.3	10.4	8.9	7.5	5.7	6.3
Wind Speed (km/hr)	158.5	160.6	171.7	182.5	173.3	177.7	190.6	200.4	223.4	229.9	205.2	173.5	187.3
Sunshine Hour (hrs)	7.1	7.4	8.0	8.9	9.3	9.4	9.6	10.2	10.0	9.4	8.0	6.8	8.7

表 3.1.2 C8 水文観測所における流量（流域面積：5,990 km²）

Year	Oct			Nov			Dec			Jan			Feb			Mar			Apr			May			Jun			Jul			Aug			Sep			AVERAGE			
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3							
65	2.05	1.00	0.00	0.10	0.18	0.13	0.13	0.16	0.425	0.37	0.20	0.57	0.59	0.73	0.224	0.328	0.247	0.192	0.131	0.151	0.119	0.664	0.001	0.628	0.600	0.000	0.600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.294

表 3.1.3 C9 水文観測所における流量（流域面積：1,250 km²）

Year	Oct			Nov			Dec			Jan			Feb			Mar			Apr			May			Jun			Jul			Aug			Sep			AVERAGE			
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3							
65	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

表 3.1.6 水質分析結果 (1/3)

Analysis Items	WHO Standard (1993)	Samples taken from Rivers on December 1998									
		Site 1 (Mazoe R.)	Site 2 (Umsweswe R.)	Site 3 (Upper M.R.)	Site 4 (Sebakwe R.)	Site 5 (Kwekwe R.)	Site 6 (Munyati R.)	Site 7 (Ngondoma R.)	Site 8 (Munyati R.)	Site 9 (Munyati R.)	Site 10 (Lower M.R.)
Color (TCU)	15.0	20.0	15.0	10.0	7.5	10.0	20.0	15.0	20.0	100.0	
Turbidity (NTU)	5.0	163.2	92.1	57.7	6.1	90.3	275.0	185.0	202.0	1,605.0	
Water Temperature (°C)		25.1	28.0	24.5	26.2	27.6	31.7	27.2	26.6	27.6	
TDS (mg/l)	1,000.0	43.3	57.3	86.7	290.7	77.2	86.0	55.0	58.5	52.7	
SS (mg/l)		0.04	0.03	0.006	0.003	0.03	0.04	0.03	0.04	1.46	
pH	6.5 - 9.5	6.7	7.1	6.9	7.1	7.8	7.7	7.4	7.4	7.1	
EC (mSm ⁻¹)		7.4	9.8	14.3	49.7	13.2	14.7	9.4	10.0	9.0	
DO (mg/l)		19.1	11.2	11.7	12.4	9.7	9.3	9.6	9.4	7.3	
Na (mg/l)	200.0	4.0	10.0	11.0	35.0	9.0	8.0	6.0	6.0	5.0	
F (mg/l)	1.50	0.05	0.06	0.07	0.18	0.06	0.12	0.05	0.05	0.03	
N (mg/l)	50.0	not detected	not detected	not detected	2.1	not detected	not detected	not detected	not detected	not detected	
P (mg/l)		not detected	not detected	0.1	not detected	not detected	not detected	not detected	not detected	not detected	
Mg (mg/l)		4.5	5.5	6.5	29.0	8.5	8.5	6.5	7.0	9.0	
Ca (mg/l)		9.0	12.3	7.4	17.2	15.6	22.9	9.8	12.3	15.6	
K (mg/l)		5.8	6.1	5.5	8.8	7.8	8.8	6.4	7.0	17.0	
Hg (mg/l)	0.001	0.02	0.09	0.09	0.08	0.11	0.11	0.10	0.09	0.20	
Pb (mg/l)	0.01	0.20	0.25	0.35	0.12	0.29	0.08	0.33	0.27	0.24	
Cr (mg/l)	0.05	not detected	not detected	not detected	not detected	not detected	0.04	0.04	not detected	0.12	
Cd (mg/l)	0.003	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	
Cu (mg/l)	1.00	not detected	0.06	0.04	0.08	0.16	0.21	0.20	0.22	0.23	
BOD (mg/l)	5.0	3.4	2.8	2.9	2.4	2.6	1.5	2.7	2.5	2.8	
COD (mg/l)	30.0	not detected	not detected	not detected	15.8	19.8	19.8	23.7	35.6	79.0	
COLIFORM (MPN/100ml) (CFU/ml)	10	920 1 x 10 ³	920 1 x 10 ³	140 2 x 10 ²	180 2 x 10 ¹	1,600 2 x 10 ⁵	> 1,800 2 x 10 ⁴	> 1,800 1 x 10 ²	> 1,800 2 x 10 ²	> 1,800 1 x 10 ⁴	

(Note) TDS : Total Dissolved Solid, SS : Suspended Solid, EC : Electric Conductivity, DO : Dissolved Oxygen, Na : Sodium, F : Fluorine,
 N : Nitrogen, P : Phosphoric Acid, Mg : Magnesium, Ca : Calcium, K : Potassium, Hg : Mercury, Pb : Lead, Cr : Chromium,
 Cd : Cadmium, Cu : Copper, BOD : Biological Oxygen Demand, COD : Chemical Oxygen Demand

表 3.1.6 水質分析結果 (2/3)

Analysis Items	WHO Standard (1993)	Samples taken from Rivers on February 1999									
		Site 1 (Mazoe R.)	Site 2 (Umsweswe R.)	Site 3 (Upper M.R.)	Site 4 (Sebakwe R.)	Site 5 (Kwekwe R.)	Site 6 (Munyati R.)	Site 7 (Ngondoma R.)	Site 8 (Munyati R.)	Site 9 (Munyati R.)	Site 10 (Lower M.R.)
Color (TCU)	15.0	2.5	5.0	5.0	2.5	7.5	10.0	2.5	5.0	5.0	7.5
Turbidity (NTU)	5.0	41.2	75.1	37.7	51.0	68.1	83.4	117.0	58.8	78.7	83.7
Water Temperature (°C)		25.8	24.9	24.6	23.9	23.2	23.9	26.2	24.3	24.9	24.8
TDS (mg/l)	1,000.0	63.8	44.5	53.8	48.6	69.0	46.8	97.1	51.5	42.1	45.0
SS (mg/l)		0.001	0.001	0.001	0.006	0.003	0.002	0.004	0.003	0.002	0.005
pH	6.5 - 9.5	7.5	7.5	7.7	7.5	7.5	7.6	7.9	7.7	7.7	7.4
EC (mSm ⁻¹)		10.9	7.6	9.2	8.3	11.8	8.0	16.6	8.8	7.2	7.7
DO (mg/l)		17.7	17.4	20.2	18.3	18.9	20.9	20.6	19.5	21.1	20.3
Na (mg/l)	200.0	8.0	7.0	5.0	7.0	11.0	6.0	15.0	7.0	6.0	6.0
F (mg/l)	1.50	0.05	0.02	0.02	not detected	not detected	not detected	0.01	not detected	0.01	not detected
N (mg/l)	50.0	2.5	not detected	4.6	2.4	5.8	0.7	3.4	3.2	not detected	not detected
P (mg/l)		0.01	0.01	0.03	0.10	0.13	0.30	0.40	0.20	1.00	1.20
Mg (mg/l)		4.5	3.5	7.0	6.0	4.0	4.0	4.5	4.0	3.5	3.5
Ca (mg/l)		13.1	8.2	7.4	6.5	13.1	7.4	21.3	9.0	7.4	9.8
K (mg/l)		3.9	5.3	4.1	5.0	5.0	4.6	7.3	4.8	5.1	6.5
Hg (mg/l)	0.001	0.12	0.09	0.11	0.10	0.11	0.12	0.07	0.11	0.14	0.07
Pb (mg/l)	0.01	not detected	not detected	0.01	not detected	0.01	0.02	0.03	0.04	0.08	0.04
Cr (mg/l)	0.05	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected
Cd (mg/l)	0.003	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected
Cu (mg/l)	1.00	not detected	not detected	not detected	0.06	0.03	0.03	0.04	0.01	0.06	0.01
BOD (mg/l)	5.0	3.6	2.0	2.6	2.9	3.8	2.8	1.8	2.7	3.0	2.7
COD (mg/l)	30.0	15.8	7.9	11.9	11.9	35.6	35.6	27.7	27.7	11.9	27.7
COLIFORM (MPN/100ml)	10	> 1,800	920	> 1,800	> 1,800	920	1,600	1,600	> 1,800	1,600	1,600
(CFU/ml)		3 x 10 ²	9 x 10 ²	9 x 10 ⁴	8 x 10 ²	7 x 10 ¹	2 x 10 ²	1 x 10 ²	7 x 10 ²	2 x 10 ³	1 x 10 ⁴

(Note) TDS : Total Dissolved Solid, SS : Suspended Solid, EC : Electric Conductivity, DO : Dissolved Oxygen, Na : Sodium, F : Fluorine, N : Nitrogen, P : Phosphoric Acid, Mg : Magnesium, Ca : Calcium, K : Potassium, Hg : Mercury, Pb : Lead, Cr : Chromium, Cd : Cadmium, Cu : Copper, BOD : Biological Oxygen Demand, COD : Chemical Oxygen Demand

表 3.1.6 水質分析結果 (3/3)

Analysis Items	WHO Standard (1993)	Samples taken from Wells on January 1999									
		Site 1 (Village 24)	Site 2 (Village 9)	Site 3 (Village 25)	Site 4 (Village 32)	Site 5 (Village 2)	Site 6 (Marundu)	Site 7 (Nyamaishi)	Site 8 (St. C. School)	Site 9 (Mak. School)	Site 10 (Ung. School)
Color (TCU)	15.0	0.0	0.0	0.0	0.0	0.0	2.5	2.5	0.0	0.0	10.0
Turbidity (NTU)	5.0	5.4	36.4	20.5	55.5	2.2	16.5	6.0	4.7	1.9	570.0
Water Temperature (°C)		28.6	27.4	27.8	27.7	25.1	28.5	26.2	27.5	27.7	26.2
TDS (mg/l)	1,000.0	501.3	108.2	294.3	80.7	445.8	233.4	685.0	869.3	413.6	459.2
SS (mg/l)		not detected	0.001	0.001	0.002	0.001	0.002	not detected	not detected	not detected	0.06
pH	6.5 - 9.5	7.2	6.5	7.2	6.3	7.1	7.5	7.6	7.3	7.3	7.0
EC (mS ^m -1)		85.7	18.5	50.3	13.8	76.2	39.9	117.1	143.6	70.7	78.5
DO (mg/l)		3.0	7.1	3.2	3.9	2.8	2.6	4.1	4.6	5.3	1.3
Na (mg/l)	200.0	11.0	8.0	49.0	12.0	52.0	245.0	175.0	62.0	21.0	17.0
F (mg/l)	1.50	0.20	0.17	0.71	0.25	0.26	0.28	0.94	0.36	0.22	0.55
N (mg/l)	50.0	7.2	8.2	0.2	0.6	8.7	0.6	1.3	14.5	1.2	0.5
P (mg/l)		not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected
Mg (mg/l)		74.5	2.5	27.5	5.5	40.5	22.5	21.0	78.0	36.0	40.5
Ca (mg/l)		97.4	29.5	50.7	17.2	100.7	80.2	67.1	125.2	103.9	101.5
K (mg/l)		not detected	15.4	0.9	9.0	not detected	2.3	not detected	0.03	11.8	30.5
Hg (mg/l)	0.001	0.10	0.08	0.10	0.09	0.09	0.10	0.11	0.11	0.11	not detected
Pb (mg/l)	0.01	0.5	0.5	0.6	0.4	0.5	0.6	0.5	0.7	0.5	0.5
Cr (mg/l)	0.05	2.9	3.2	3.2	3.5	3.0	2.9	2.4	2.4	2.8	2.1
Cd (mg/l)	0.003	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected
Cu (mg/l)	1.00	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected	not detected
BOD (mg/l)	5.0	1.6	0.04	0.08	0.08	not detected	not detected	0.92	1.8	not detected	0.08
COD (mg/l)	30.0	not detected	7.9	15.8	7.9	4.0	7.9	7.9	15.8	11.9	4.0
COLIFORM (MPN/100ml) (CFU/ml)	10	> 1,800 3 x 10 ²	920 9 x 10 ²	> 1,800 9 x 10 ⁴	> 1,800 8 x 10 ²	920 7 x 10 ³	1,600 2 x 10 ²	1,600 1 x 10 ²	> 1,800 7 x 10 ²	1,600 2 x 10 ³	1,600 1 x 10 ⁴

(Note) TDS : Total Dissolved Solid, SS : Suspended Solid, EC : Electric Conductivity, DO : Dissolved Oxygen, Na : Sodium, F : Fluorine,
 N : Nitrogen, P : Phosphoric Acid, Mg : Magnesium, Ca : Calcium, K : Potassium, Hg : Mercury, Pb : Lead, Cr : Chromium,
 Cd : Cadmium, Cu : Copper, BOD : Biological Oxygen Demand, COD : Chemical Oxygen Demand

表 3.1.7 水銀及び鉛に関する水質分析結果

(Unit : mg/l)

Sampling Locations	Result of Analysis in Japan	
	February, 2000	Lead (Pb)
(River)		
Site 1. Mazoe tributary, near Mari Mari Ranch	0.00005	0.0017
Site 2. Umsweswe river, 1-2 km downstream of Vic	<0.00003	0.0026
Site 3. Upper Munyati river, 1 km upstream of Lucky Beanie	0.00004	0.0025
Site 4. Sebakwe river, 5-6 km upstream of confluence with Kwekwe river	<0.00003	0.0035
Site 5. Kwekwe river, 1-2 km upstream of confluence with Sebakwe river		
Site 6. Munyati river, causeway/bridge on Empress Mine road	0.00008	0.0048
Site 7. Ngondoma tributary, 1-2 km downstream of Kudu damsite	0.00007	0.0082
Site 8. Munyati river, just downstream of confluence with Mtanke river	0.00003	0.0045
Site 9. Munyati river, Renji bridge near Renji Camp	<0.00003	0.0017
Site 10. Munyati river, downstream of Copper Queen	<0.00003	0.0005
Site 11. Nyarupakwe Dam Site	<0.00003	<0.0002
(Well)		
Site 1. Sanyati-K21, BH village 24	<0.00003	0.0040
Site 2. Sanyati-K22, BH village 9	<0.00003	0.0072
Site 3. Sanyati-K23, BH village 25	<0.00003	0.0116
Site 4. Sanyati-K24, BH village 32	<0.00003	0.0057
Site 5. Muzvezve I-K17, BH village 2	<0.00003	0.0044
Site 6. Chisina I-GS 23 Vidco Batanai, BH Marundu	<0.00003	0.0021
Site 7. Chisina I-GS 24 Vidco Murumemkuru, BH Nyamatshemi	<0.00003	0.0014
Site 8. Chisina II-GS 24 Vidco Mhungu, BH St. Cuthberts School	0.00033	0.0029
Site 9. Makore I-GN 11 Vidco Kushinga, BH Makore School	<0.00003	0.0019
Site 10. Copper Queen Small Scale Commercial Farming Area, BH Ungwe School	<0.00003	0.0496

Note : WHO Standard (1993) Hg = 0.001 mg/l, Pb = 0.01 mg/l

表 3.1.8 調査対象地域の人口及び世帯 (1998)

District/ Ward No.	Ward Name	1992 Figures Based on Census				Estimated 1998 Figures				Popul. Increase 92-98 (% p.a.)	Area b/ (ha)	Popul. Density in 1998 (prn/km ²)
		Popu- lation (prn)	H'hold (No.)	Ave. Size of HH (prn)	Popu- lation a/ (prn)	H'hold a/ (No.)	Ave. Size of HH a/ (prn)	Farm Popul. c/ (prn)	Farm H'hold c/ (No.)			
Kadoma												
K17	Muzvezve 1	NA	NA	NA	8,829	1,472	6.00	8,388	1,398	-	101,000	8.74
K20	Ward Twenty	NA	NA	NA	10,998	1,833	6.00	10,448	1,741	-	6,557	167.73
K21	Ward Twenty One	NA	NA	NA	5,708	951	6.00	5,423	903	-	6,173	92.47
K22	Ward Twenty Two	NA	NA	NA	5,757	960	6.00	5,469	912	-	8,589	67.03
K23	Ward Twenty Three	NA	NA	NA	13,474	2,246	6.00	12,800	2,134	-	10,123	133.10
K24	Ward Twenty Four	NA	NA	NA	9,867	1,645	6.00	9,374	1,563	-	13,458	73.32
	Sub-total or average	NA	NA	NA	54,633	9,107	6.00	51,901	8,652	-	145,900	37.45
Gokwe North												
GN11	Makore 1	9,159	1,431	6.40	10,721	2,117	5.06	10,185	2,011	2.66	13,452	79.70
GN12	Makore 2	6,148	1,027	5.99	7,197	1,528	4.71	6,837	1,452	2.66	16,186	44.46
	Sub-total or average	15,307	2,458	6.23	17,918	3,645	4.92	17,022	3,463	2.66	29,638	60.46
Gokwe South												
GS23	Chisina I	14,376	2,336	6.15	17,251	2,875	6.00	16,388	2,731	3.09	82,813	20.83
GS24	Chisina II	10,186	1,807	5.64	13,303	2,217	6.00	12,638	2,106	4.55	60,060	22.15
	Sub-total or average	24,562	4,143	5.93	30,554	5,092	6.00	29,026	4,838	3.71	142,873	21.39
	Total or Average	-	-	-	103,105	17,844	5.78	97,950	16,952	-	-	-
Kwekwe Rural												
KW6	Mabura	5,542	944	5.87	6,435	1,096	5.87	6,113	1,041	2.52	16,942	37.98
KW7	Sidakeni	5,529	1,106	5.00	6,419	1,284	5.00	6,098	1,220	2.52	14,296	44.90
	Total or Average	11,071	2,050	5.40	12,854	2,380	5.40	12,211	2,261	2.52	31,238	41.15

Source:

a/: Estimated by each Rural District Council as 1998 figures.

b/: AGRITEX in each district except for K17 which is estimated by the JICA Study Team based on 1/50,000 ward boundary map.

c/: Assumed that 95% of population and households in 1998 are engaged in agriculture.

表 3.1.9 世帯調査及び世帯構成員調査結果の概要 - 1/3

<p>1. Household and Population</p>
<p>The total population of the sample households is 2,543 with male and female ratio of about 50:50, and the average size of household is 7.1. As for the age group composition, about 40% of the population belong to the age group of less than 15 years old, while 5% belong to the age group of over 61 years old. The economically active population which belongs to the age group 16-60 years old is to be about 54% of the total population.</p> <p>Major ethnic groups are Zezuru and Karanga in the potential irrigation development area, and consist of 39% and 36% of the total sample households, respectively. It is said that Zezuru are the typical group in Mashonaland West province. Marriage between different Shona sub-tribes is common, and villagers consisting of three to four tribes support each other on special occasions, e.g. funerals and marriage. Because of such facts, it is considered that it is not necessary to pay to the tribal issue in a development planning. In general, however, mutual support relationships among neighbors are weak in the resettlement area compared to that in the communal area where household are more closely interrelated.</p> <p>As for the period of settlement, 37% of the sample households settled in their respective villages more than 30 years ago on average. The proportion of households settled more than 30 years ago is 49% in Gokwe North, 45% in the Gokwe South, and 28% in Kadoma district which shows comparatively lower percentage than the former two districts. In the resettlement area alone, although its sample size is considerably small, the result of analysis reveals that the households settled less than 20 years ago are 86% of the samples.</p>
<p>2. Education Status</p>
<p>As a whole, about 24% of the household heads received no formal education, and about 19% did not complete primary school. Accordingly, it can be said that nearly half of the household heads are non-educated and/or did not complete primary school in the potential irrigation development area. On the other hand, the proportion of household heads who were educated beyond primary school is about 29%. However, the proportion of GCE-A level graduates (which correspond to high school graduates) is only 1.4% of the household heads.</p>
<p>3. Occupation</p>
<p>85% of the heads of household are farmers followed by salary workers (6%) and in private business (3%). The proportion of farmers is slightly higher in Gokwe North district than that in other two districts. The household heads who have no job are small in proportion at only 3%. The occupation of 65% of household heads is farming, follow by salary workers, wage labors and jobless accounting for 8%, 2% and 9%, respectively.</p>
<p>4. Involvement in community organization</p>
<p>Religious organization, farmers' group and ZFU are the major community organizations in the area, and their proportion of membership are 38%, 13% and 10% of the household heads, respectively. However, a fairly large proportion of the households heads (about 21%) do not belong to any community organization. Of the non-members, the greater proportion is male at 59% compared to 41% of the female population. The community organizations relevant to rural and agricultural development are generally inactive as indicated by the low membership rates indicated by the survey.</p>
<p>5. Cash Income Source</p>
<p>Among several sources of income, "crops" is the most important cash income source of the households, followed by livestock, salary, wage and remittance. The importance of income from other sources than crop is low.</p>
<p>6. Fuel for Cooking/Heating</p>
<p>Among several fuel sources, fuel wood is the most important for cooking and heating purposes in the area. Use of other sources such as crop residue and paraffin is not a common practice in the area. Almost all the households fetch their own fuel wood needs, and only 2% of the households buy their fuel wood.</p> <p>The distance or time required to get to fuel wood sources is about 54 minutes to the first source and 45 minutes to the second source on average. Although they are spending about one hour to get to fuel wood sources, only 9% of households answered that fuel wood was very difficult to obtain. Spending about one hour to fuel wood sources is likely to be common practice for most households in the area. The availability of fuel wood is lower in Gokwe North district where forests are scarcely expanded.</p>
<p>7. Food</p>
<p>The proportion of households having sufficient production greater than their requirements is on average about 30% for cereals, 10% for vegetables and 3% for meat. Household needs are purchased or exchanged in about 36% of the households in cereals, 54% in vegetables and 79% in meat. Based on these figures, it appears that about one-third of the households have surpluses of cereals, vegetables cultivated in the area are mostly for home consumption (although these are produced insufficiently), and meats are insufficient in many households.</p>

表 3.1.9 世帯調査及び世帯構成員調査結果の概要 - 2/3

<p>8. Health and Sanitation</p>
<p>Malaria is the most popular disease, and nearly 50% of children and adults had an occurrence during the last 12 months. The rates of occurrence in other diseases are comparatively small. For children, 4% for diarrhea, 2% for skin disease, and 2% for respiratory disease, and for adults 6% for respiratory disease, 4% for diarrhea, 2% for eye disease and 2% for pneumonia. On the other hand, about 37% of children and 24% of adults had "no disease" during the last 12 months.</p> <p>To the question about a treatment when they had slight illnesses, 76% of households selected the answer of "go to a clinic/hospital within the ward". In case of severe illnesses, 55% selected the answer of "go to a clinic/hospital outside the ward". The proportion of households whose answers were "no medical treatment" is small at 6% in case of slight illnesses, and 3% in severe illnesses. It can be said that the people in the area depend mainly on medical services available in and around the area when they fall sick.</p>
<p>9. Family planning</p>
<p>As for the survey results on the status of family planning, 73% of the households indicated that they had been visited by a family planning health worker in their area. The availability of the workers is much higher in Gokwe North where 97% cited that they were receiving the health workers. In Gokwe South, only 51% had been visited by the health personnel. In general, however, the services of family planning are being strengthened in the area through the development of clinics and/or health centers.</p>
<p>10. Agricultural Supporting Services</p>
<p>The proportion of households who receive the services in every year is 80% in AGRITEX extension, 50% in financial support, and 60% in veterinary service. It can be evaluated that the AGRITEX extension service is more densely provided than other two services in the area. Among the districts, the AGRITEX service seems to be inactive in Gokwe North district. Similarly, the financial service is weakly provided in Gokwe North and Gokwe South districts, and the veterinary service is low in Gokwe South. The proportion of households who answered that the services are difficult to access is 27% in the AGRITEX service, 38% in financial service, and 35% in veterinary service. Among the three districts, the services are difficult to access in the districts where the respective services are weakly provided as evaluated in the above.</p>
<p>11. Role of Male and Female</p>
<p>In the household member survey, male and female household members over 16 years of age were asked the frequency of their participation in eight major categories of activities. These eight categories include (i) home activities, (ii) farming activities, (iii) raising of livestock, (iv) keeping of poultry and other small animals, (v) forestry and bush activities, (vi) communication, and (vii) religious/cultural activities. In all, these eight categories subsume 48 items of activities.</p> <p>Home activities include fetching drinking water, cooking, washing, sweeping the house, house repair, child/elderly care, kitchen gardening and shopping in the market. The survey result shows that women play a more dominant role in fetching drinking water, cooking, washing, sweeping the house, and sewing and knitting. In contrast, the percentage of men who "usually participate" in house repair is greater than that of women. Both men and women are usually engaged in kitchen gardening, shopping in the market and child/elderly care.</p> <p>In the farming activities, the proportion of men "usually engaged" is generally higher than that of women in many activities. However, women are also engaged in these activities with considerably high engagement rates except for plowing, repairing of farm and protecting against wild animals. It is clear that women are also playing an important role in many farming activities in addition to home activities most of which are undertaken by women. Because of the survey results showing considerably high engagement rate of men in selling crops and shopping in the market, it is considered that men tend to manage the household economy in the Study Area.</p> <p>In livestock raising, the proportion of men "usually engaged" is higher than that of women in all activities. Men and women who "usually engage" in selling dairy products are very small in percentages (6% in men and 4% in women). Thus it is considered that there are limited number of households selling dairy products such as milk in the study area.</p> <p>In contrast to the raising of large livestock, women dominate in the raising of poultry and other small animals. The main activities included in forestry/bush activities are collecting fuel wood, timber harvest and selling fuel wood. Both men (59%) and women (58%) play a near equivalent part in collecting fuel wood. However, more men (50%) than women (12%) are engaged in timber harvesting. Engagement rates in selling fuel wood are very small both in men and women showing that most of households in the Study Area consume their own harvested fuel wood.</p> <p>Men's involvement is higher than women's in all communication activities. However, women also "usually participate" to a certain extent in these activities, e.g. 50% in getting information from radio (households having TV are negligible small) and 37% in attending community meetings. The participation rates are low both in men and women in political discussion with others and getting information from newspapers.</p> <p>In religious and cultural activities, women's participation is higher in worship ceremony and festival preparation. While men dominantly engage in other activities such as sport events and games.</p>

表 3.1.9 世帯調査及び世帯構成員調査結果の概要 - 3/3

<p>12. Activities that People Want to Make Easy</p> <p>In the household member survey, adult members (over 16 years old) were asked which activity they want to lighten their workload among their daily activities.</p> <p>For men, major activities they want to lighten the workload are all farming related activities such as plowing and weeding except for collecting of fuel wood. These are also similar in women except for fetching drinking water, because this is largely done by women. It is clear that most of men and women want to make easy their farming activities which consume more labor and time than other activities. Further, both men and women want to make easy the fetching of water.</p>
<p>13. People's Present Concerns</p> <p>The overall results on the degrees of people's concerns in connection with various economic, political and cultural issues show that the people strongly concerned about "cash income", "irrigation", "food availability" and "crop productivity". The scores of all these items are ranked from 1st to 4th both for men and women. The next higher scores are shown in the items of "motorable roads", "electricity", "health", "communication facility", and "drinking water". The items having large differences between men and women are "health" and "sanitation". In these items, women's scores are higher than men's.</p>
<p>14. People's Participation to Collective Action</p> <p><i>a. People's Experience in Collective Action</i></p> <p>The people's collective action taken in the past on the above mentioned items was also asked to the household members. As a result, more than 60% of men and women have equally taken actions in the past on their concerns of "food availability", "cash income" and "crop productivity". And more than 50% of men and women have also equally taken actions with "sanitation", "drinking water availability", "labor force availability", "religious beliefs" and "meeting on community development". In "land slide/soil erosion", 57% of men and 46% of women have taken actions. In other items of concerns, such percentages are all less</p> <p><i>b. Willing to Take Actions/Participate</i></p> <p>The household members were asked whether they were willing to take actions/participate in improvement/development of the above items. As a result, more than 90% of men and women are equally willing to take actions with regards to improving their "cash income". More than 80% of both genders were also willing to take action in "food availability" and "crop productivity". More than 70% of both genders were also interested in "irrigation", "land slide/soil erosion", "electricity supply", "sanitation", "health", "fuel wood availability", "drinking water availability" and "communication facility". There are small differences between men and women in their willingness for improvement/development of their rural economy and social infrastructure.</p>
<p>15. Preference for Irrigated Land</p> <p>In the household member survey, a question was asked on whether they would like to have land within the irrigation command area. Their answers are summarized in the table below, 79% of men, 74% of women and 77% of both genders showed a willingness to have irrigated land.</p> <p>The household members whose answers were "yes" in the above question were further asked about their preference in crops that they want to cultivate in the irrigated land. As a result, 49% of people indicated maize and 32% cotton for summer crops, and 36% of them prefer vegetables, 18% wheat, 17% beans, and 13% maize for winter crops.</p> <p>To the household members who liked to have irrigation land, further question was asked whether they would still like land even if they have to pay for water charges. The results of this question reveal that about 94% maintained that they would still like land even if they were to pay for water charges. Only 4% would not like land if water charges are levied.</p> <p>In the same manner, a further question whether they would still like irrigation land even when they may have to organize a water user group for routine operation and maintenance of irrigation system. To this question, 91% of all the respondents who would like irrigation land said that they would like to participate in a water user group if group work for operation and maintenance does not disturb the farming activities. About 6% did not like to have irrigation land if they have to do group work for the operation and maintenance.</p> <p>The other question whether they still would like land even if this entails resettlement in a location nearby the irrigation area. The results clarify that only about 19% maintained that they would like irrigation land even if they have to pay for the cost of resettlement. About 55% of the respondents are willing to resettle provided the government assists them to cover the costs of resettlement. A further 20% said that they would rather not have land in the irrigation area if this entails resettlement. About 6% could not answer at the time of interview. The answers of this question are different between men and women. The percentage of respondents who answered that they would rather not have irrigation land are larger in women (22%) than men (17%).</p> <p>The reasons why some people (about 23% of household members) do not want to have irrigation land were also asked in the survey. The major reasons given by the respondents are labor shortage in irrigated farming (22%), too old (19%), and sufficient income with present farming (12%). Other reasons given for not wanting irrigation land include lack of interest in irrigation (7%), ill health (3%), exacting labor demands of irrigation (3%), etc.</p>

表 3.1.10 調査対象地域の家畜飼養頭数 1/

District	Ward No.	Type of Settlement	Grazing		Livestock Population (No.)					LUs 3/	Stocking Rate (ha/LU)	No. of Household	LUs per Household	Grazing Area per Household (ha)
			Area (ha)	Land (ha)	Cattle	Goat	Donkey	Sheep						
Kadoma	K 17	R	92,637	86,000	8,379	3,880	536	303	5,767	14.9	1,437	4.0	59.8	
	K 20	C	6,557	3,148	1,847	3,844	102	46	1,558	2.0	1,525	1.0	2.1	
	K 21	C	6,173	2,963	2,262	2,783	52	158	1,683	1.8	791	2.1	3.7	
	K 22	C	8,589	4,123	2,370	1,310	16	25	1,565	2.6	798	2.0	5.2	
	K 23	C	10,123	4,859	3,226	2,472	60	102	2,229	2.2	1,868	1.2	2.6	
	K 24	C	13,458	6,460	2,630	2,557	99	94	1,903	3.4	1,368	1.4	4.7	
	Sub-total 4/		137,537	107,553	20,714	16,846	865	728	14,705	7.3	7,787	1.9	13.8	
	Sub-total 5/		44,900	21,553	12,335	12,966	329	425	8,938	2.4	6,350	1.4	3.4	
Gokwe North	GN 11	C	13,452	8,871	3,589	1,350	130	80	2,374	3.7	2,117	1.1	4.2	
	GN 12	C	16,186	9,200	3,381	6,015	132	330	2,742	3.4	1,528	1.8	6.0	
	Sub-total		29,638	18,071	6,970	7,365	262	410	5,116	3.5	3,645	1.4	5.0	
Gokwe South	GS 23	C	51,694	29,052	6,982	3,636	210	202	4,699	6.2	2,336	2.0	12.4	
	GS 24	C	21,266	11,951	6,439	1,194	142	138	4,082	2.9	1,949	2.1	6.1	
	Sub-total		72,960	41,003	13,421	4,830	352	340	8,781	4.7	4,285	2.0	9.6	
	Total 6/		240,135	166,627	41,105	29,041	1,479	1,478	28,602	5.8	15,717	1.8	10.6	
	Total 7/		147,498	80,627	32,726	25,161	943	1,175	22,835	3.5	14,280	1.6	5.6	

Source: AGRITEX

1/: Livestock population in the 10 project related wards

4/: Livestock population in the 6 project related wards in Kadoma district

5/: Livestock population in the 5 project related communal wards in Kadoma district, excluding a resettlement area ward of K 17

6/: Total livestock population in the 10 project related wards

7/: Total livestock population in the 9 project related communal wards in the Study Area, excluding a resettlement area ward of K 17

2/: LUs = Livestock Units

3/: R = resettlement area; C = communal area

表 3.1.11 ジンバブエの主な農業研究所及び試験場

Name of Station/ Institute	Major Objective Crops/ Activities	Location	Responsible Organization	Natural Region	Remarks
Public Sector					
<u>Research on Crops</u>					
1. Horticultural Research Center (HRC)	Horticultural crops	Marondera, Mashonaland East Province	DR&SS, MOLA	Ila	Under No.1
2. Nyanga Experimental Station	Potatoes and fruit trees	Nyanga, Manicaland Province	DR&SS, MOLA	I	Under No.1
3. Chipinge Research Station	Coffee and tea	Chipinge, Manicaland Province	DR&SS, MOLA	I	
4. Cotton Research Institute (CRI)	Cotton	Kadoma, Mashonaland West Province	DR&SS, MOLA	III	
5. Crop Breeding Institute (CBI)	Breeding of food crops	Harare	DR&SS, MOLA	Ila	
6. Agronomy Research Institute	Food crops	Harare	DR&SS, MOLA	Ilc	
7. Plant Protection Research Institute	Plant health & quarantine	Harare	DR&SS, MOLA	Ilc	
8. Chiredzi Research Station	Agronomy in NR IV and V	Chiredzi, Masvingo Province	DR&SS, MOLA	V	Under No. 6
9. Kutsaga Research Station	Flue cured tobacco	Harare	Tobacco Research Board	Ila	Parastatal
10. Banket Research Station (out station of No. 9)	Burley tobacco	Banket, Mashonaland West Province	Tobacco Research Board	Ila	Parastatal
11. Hatcliffe	Irrigation, soil conservation, etc.	Harare	AGRITEX, MOLA		
<u>Research on Livestock</u>					
1. Makoholi Research Station	(Suitable animals	Mashvingo, Masvingo Province	DR&SS, MOLA	IV	
2. Grasslands Research Station	Beef production	Marondera, Mahonaland East Province	DR&SS, MOLA	Ila	
3. Henderson Research Station	Poultry feeds	Mazowe, Mashonaland Central Pro.	DR&SS, MOLA	Ila	
4. Matopos Research Station	(Milk production	Matopos, Matabeleland South Province	DR&SS, MOLA	IV	
5. Pig Industry Bord	Pig	Aecturus, Mahonaland East Province	Pig Industry Bord	Ila	Parastatal
Private Sector and Others					
<u>Research on Crops</u>					
1. Chiredzi Sugar Research Station	Sugar cane	Chiredzi, Masvingo Province	Cane Growers Association	V	
2. Export Agents (e.g. Hortico and Can Pak)	Suitability test of export crops	Several locations, e.g. Harare, Chegulu			
3. Seed Suppliers (e.g. Seed Coop)	Demonstration of crops	Several locations, including Kadoma			
4. Agro Chemical Companies (e.g. ZFC)	Farm trials on chemicals	Several locations, e.g. Harare, Kwekwe			
5. Research Stations under ART	Food crops (only trials)	Harare	Agri. Research Trust		CFU
6. University of Zimbabwe	Food crops, soils, economy, etc.	Harare		Ila	
<u>Research on Livestock</u>					
1. Irvin's	Poultry	Harare		Ila	
2. Henderson Research Station	Poultry feeds	Mazowe, Mashonaland Central Pro.		Ila	
4. University of Zimbabwe	Small stock feeds	Harare		Ila	

Source: Zimbabwe's Smallholder Agricultural Sector Development Strategy and Action Plan, 1997 - 2020
and Zimbabwe's Agricultural Policy Framework, 1995 - 2020

表 3.1.12 調査対象地域における農業普及職員の数と交通手段

Staff	Grade	(Unit)	Kadoma	Gokwe North	Gokwe South	Total or Average	Kwekwe
Extension Staff							
DAEO	University graduate	(person)	1	0	1	2	1
	Diploma holder	(person)	0	0	0	0	0
	Certificate holder	(person)	0	0	0	0	0
	Sub-total	(person)	1	0	1	2	1
AEO 1/	University graduate	(person)	0	0	0	0	0
	Diploma holder	(person)	5	3	2	10	4
	Certificate holder	(person)	0	0	0	0	0
	Sub-total	(person)	5	3	2	10	4
AES 1/	University graduate	(person)	0	0	0	0	0
	Diploma holder	(person)	0	0	0	0	0
	Certificate holder	(person)	4	3	8	15	2
	Sub-total	(person)	4	3	8	15	2
AEW 1/	University graduate	(person)	0	0	0	0	0
	Diploma holder	(person)	0	0	1	1	0
	Certificate holder	(person)	32	36	45	113	25
	Sub-total	(person)	32	36	46	114	25
No. of FAEOs (AEO+AES+AEW)		(person)	41	42	56	139	31
No. of Farm Household per FAEO		(person)	673	805	925	814	891
No. of Farm Household in 1998		(No.)	27,589	33,821	51,784	113,194	27,636
Vehicles/bicycles							
Car		(No.)	2	2	2	6	3
Motorcycle		(No.)	24	31	39	94	13
Bicycle		(No.)	12	8	15	35	17
Total		(No.)	38	41	56	135	33

Source: Respective District Office of AGRITEX; as of January 1999

1/: Former position titles of extension staffs (FAEOs)

表 3.2.1 クドゥダム規模及び灌漑面積比較検討表

項 目	Case					
	1	2	3	4	5	6
(1) Scale of Kudu Dam						
a) Dam Height (m)	72.7	72.7	62.7	62.7	59.7	53.7
b) Storage Capacity (MCM)	1,551.4	1,551.4	972.6	972.6	828.6	580.6
c) Embankment Volume (m ³)	9,557,000	9,557,000	6,068,000	6,068,000	5,237,000	3,842,000
(2) Irrigation Area						
a) Communal & Resettlement Area						
Gravity Irrigation Area(ha)	8,992	8,992	8,992	8,992	8,992	8,992
Pump Irrigation Area(ha)	5,508	9,215	288	7,008	4,238	0
b) Small Scale Commercial Farm(ha)	6,000	0	3,840	0	0	0
c) Large Scale Commercial Farm(ha)	4,500	6,793	2,880	0	0	0
Total(ha)	25,000	25,000	16,000	16,000	13,230	8,992
(3) Construction Cost						
a) Financial Cost(1,000Z\$)						
i) Kudu Dam	3,640,574	3,640,574	2,632,135	2,632,135	2,493,793	2,020,519
ii) Main & Secondary Irrigation Canal	3,519,230	3,812,076	2,577,769	3,284,115	2,865,769	2,245,846
iii) On-farm Development						
- Communal & Resettlement Area	697,015	697,015	697,015	697,015	697,015	697,015
- Small Scale Commercial Farm	637,560	0	408,038	0	0	0
- Large Scale Commercial Farm	853,875	1,288,972	546,480	0	0	0
Total	9,348,254	9,438,637	6,861,437	6,613,265	6,056,577	4,963,379
(Z\$/ha)	373,930	377,545	428,840	413,329	457,791	551,977
(US\$/ha)	9,840	9,935	11,285	10,877	12,047	14,526
b) Economic Cost(1,000Z\$)	7,478,603	7,550,910	5,489,150	5,290,612	4,845,261	3,970,703
(Z\$/ha)	299,144	302,036	343,072	330,663	366,233	441,582
(US\$/ha)	7,872	7,948	9,028	8,702	9,638	11,621
(4) Benefit						
a) Financial Benefit(1,000Z\$)	1,028,026	1,028,026	657,937	657,937	544,031	369,760
(Z\$/ha)	41,121	41,121	41,121	41,121	41,121	41,121
(US\$/ha)	1,082	1,082	1,082	1,082	1,082	1,082
b) Economic Benefit(1,000Z\$)	1,393,711	1,393,711	891,975	891,975	737,552	501,290
(Z\$/ha)	55,748	55,748	55,748	55,748	55,748	55,748
(US\$/ha)	1,467	1,467	1,467	1,467	1,467	1,467
(5) IRR(%)	10.1	10.0	9.0	9.3	8.5	7.2
B/C(Discount Rate = 10%)	1.01	1.00	0.88	0.92	0.83	0.69

表 3.2.2 作物別必要農作業労働力

		(man-day/ha)													
Crops	Practices	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	
Family labor balancing															
Maize	Plowing/harrowing										0.4	0.4		0.8	
	Seeding										2.2	2.2		4.4	
	Top dressing,1	1											1	2.0	
	Weeding	5.7	5.6	5.6								5.6		22.5	
	Spraying	2	1.9											3.9	
	Irrigation	2	2	2								2	2	2	12.0
	Harvesting			5	5										10.0
	Threshing					7.5	7.5								15.0
	Sub-total		10.7	9.5	12.6	5.0	7.5	7.5	0.0	0.0	0.0	4.6	10.2	3.0	70.6
Cotton	Plowing/harrowing										0.4	0.4		0.8	
	Seeding										1.5	1.5		3.0	
	Basal dressing										1.5	1.5		3.0	
	Top dressing,1												1.5	1.5	
	Weeding	6	6	6	6									6	30.0
	Spraying	2	2	2	2	1.6						2	2	2	15.6
	Irrigation	2	2	2	2	2						2	2	2	16.0
	Sub-total		8.0	8.0	8.0	8.0	1.6	0.0	0.0	0.0	0.0	5.4	5.4	9.5	53.9
	Groundnuts	Plowing/harrowing										0.7			0.7
Seeding											7.2			7.2	
Basal dressing											0.41			0.41	
Weeding		5	4.5									5	5	19.5	
Irrigation		2	2								2	2	2	10.0	
Spraying		2.9	3									2.9	2.9	11.7	
Harvesting				3	3									6.0	
Shelling						15	14								29.0
Sub-total			9.9	9.5	3.0	3.0	15.0	14.0	0.0	0.0	0.0	10.3	9.9	9.9	84.51
Wheat	Plowing/harrowing					0.8								0.8	
	Seeding					0.5								0.5	
	Basal dressing					1								1.0	
	1st top dressing						0.5							0.5	
	Weeding						15	15	15					45.0	
	Irrigation					2	2	2	2					8.0	
	Spraying						3.9	3.9						7.8	
	Harvesting									10				10.0	
	Drying									10				10.0	
	Threshing										12			12.0	
	Sub-total		0.0	0.0	0.0	0.0	4.3	21.4	20.9	17.0	20.0	12.0	0.0	0.0	95.6
	Tomato	Plowing	0.20	0.17											0.37
		Harrowing	0.15	0.15										0.3	0.8
Transplanting													15.8	15.8	
Basal dressing													3.7	3.7	
1st top dressing		10.9												10.9	
Weeding		8	8	8	1.3									25.3	
Spraying		7.8	7.8	7.8										23.4	
Irrigation		3	3	3	2									11.0	
Sub-total		30.1	19.1	86.3	70.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.8	226.07	
Cabbage	Plowing			0.1	0.1	0.1								0.3	
	Harrowing			0.1	0.1	0.1								0.3	
	Seeding		1	1	0.8									2.8	
	Transplanting			23.2	23.2	23.2								69.6	
	Basal dressing			0.4	0.4	0.3								1.1	
	1st top dressing				3	3	2.9							8.9	
	Weeding			5	5	5	5	4.6						24.6	
	Irrigation		3	3	3	3	3	2						17.0	
	Spraying			5.9	5.9	5.9	5.7							23.4	
	Sub-total	0.0	4.0	38.7	41.5	54.6	30.6	21.2	0.0	0.0	0.0	0.0	0.0	190.6	
Paprika	Plowing/harrowing											0.8		0.8	
	Seeding											4.5		4.5	
	Basal dressing											2		2.0	
	1st top dressing												2.0	2.0	
	2nd top dressing		2										2.0	4.0	
	Weeding	5.6	5.6	5.7										5.6	22.5
	Irrigation	3	3	2								3	3	14.0	
	Spraying		3.9											3.9	7.8
	Harvesting			15	15										30.0
	Sub-total	8.6	14.5	22.7	15.0	0.0	0.0	0.0	0.0	0.0	0.0	10.3	16.5	87.6	
Dry beans	Plowing/harrowing											0.8		0.8	
	Seeding											4.5		4.5	
	Basal dressing											2		2.0	
	1st top dressing												2.0	2.0	
	2nd top dressing		2										2.0	4.0	
	Weeding	7	8.5											7	22.5
	Spraying	3.9	3.9										3.9	3.9	15.6
	Irrigation	2	2										2	2	8.0
	Sub-total	12.9	14.4	10.0	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.2	14.9	77.4
Baby corn	Plowing/harrowing										0.4	0.4		0.8	
	Seeding										2.2	2.2		4.4	
	Top dressing	1											1	2.0	
	Weeding	5.7	5.6	5.6								5.6		22.5	
	Spraying	2	1.9											3.9	
	Irrigation	2	2	2							2	2	2	12.0	
	Harvesting			5	5									10.0	
	Sub-total	10.7	9.5	12.6	5.0	7.5	7.5	0.0	0.0	0.0	0.0	4.6	10.2	3.0	70.6

表 3.2.3 事業無しの場合の作物収支表 (1/3 : トウモロコシ)

(unit:kg,man-day, Z\$)

Particulars	Materials			Labor			Animal/Machine			Total Value	Remarks
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value		
1. Production Cost											
1) Land preparation											
-Plowing				0.8	38.5	30.8	1.6	546	874	904.4	
2) Nursery preparation											
3) Seeding											
-Seed preparation											
-Seeding	25	28.50	713	4.48	38.5	172				885	
4) Transplanting, if any											
5) Fertilizing											
-Basal Compound D	40	7.90	316							316	
-Top/side dressing											
1st Ammonium Nitrat	40	8.30	332	1.5	38.50	57.8				389.8	
6) Earthing											
7) Weeding				22.5	38.50	866	0.3	833	250	1116	
8) Spraying of agrochemical											
-Thiodan	1.6	402	643	1.56	38.50	60.1				703.3	
9) Irrigating											
10) Harvesting											
-Harvesting				1.6	38.50	61.6				61.6	
-Drying											
-Threshing				2.4	38.50	92.4				92.4	
-Hauling											
11) Miscellaneous Bags(piece)	16	7.80	125							124.8	
Bag transport	16	####	176							176	
2. Others											
3) Administration costs											
Total			2305			1341			1124	4769	
3. Gross Income				Unit yield (ton/ha)		Unit Price		Gross Income			
				0.80		Z\$ 6400 /ton		Z\$ 5120 /ha			
4. Net Income	Z\$		351	/ha							

表 3.2.3 事業無しの場合の作物収支表 (2/3 : 綿花)

(unit: kg, man-day,Z\$)

Particulars	Materials			Labor			Animal/Machine			Total	
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value	Value	Remarks
1. Production Cost											
1) Land preparation											
-Plowing				0.4	38.5	15.4	1.6	546.0	873.6	889.0	
2) Nursery preparation											
3) Seeding											
-Seed preparation											
-Seeding	25.0	16.70	417.5	6.0	38.5	231.0				648.5	
4) Transplanting, if any											
5) Fertilizing											
-Basal Compound L	60.0	13.10	786.0			0.0				786.0	labor incl.
-Top/side dressing											
1st Ammonium Nitrate	30.0	8.30	249.0	1.0	38.5	38.5				287.5	
6) Earthing											
7) Weeding			0.0	30.0	38.50	1155	0.45	833.0	374.9	1529.9	
8) Spraying of agrochemical											
-Marshal(litre)	0.3	552	165.5	4.7	38.50	181.0				346.4	
-Carbryl	1.2	375	450.0	4.7	38.50	181.0				631.0	
-Synthetic Pyretheroid(litre)	0.6	619	371.3	4.7	38.50	181.0				552.2	
9) Irrigating											
10) Harvesting											
-Harvesting (z\$/kg)			0.0	600	0.45	270.0				270.0	
-Hauling											
11) Miscellaneous											
bags,bale	3.6	60.00	216.0							216.0	
transport/bale	3.6	160.0	576.0							576.0	
2. Others											
3) Administration costs											
Total			3231			2253			1248	6732	
3. Gross Income											
			Unit yield (kg/ha)			Unit Price			Gross Income		
			600			Z\$ 14.9 /kg			Z\$ 8940		
4. Net Income	Z\$		2208 /ha								

表 3.2.3 事業無しの場合の作物収支表 (3/3 : ラッカセイ)

(unit: kg, man-day,Z\$)

Particulars	Materials			Labor			Animal/Machine			Total	
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value	Value	Remarks
1. Production Cost											
1) Land preparation											
-Plowing				0.4	38.5	15.4	1.6	546	873.6	889.0	
2) Nursery preparation											
3) Seeding											
-Seed preparation											
-Seeding kg	100.0	35.00	3500	7.2	38.5	277				3777.2	
4) Transplanting, if any											
5) Fertilizing											
-Basal Gypsum, kg	50.0	2.10	105	0.41	38.5	15.79				120.8	
-Top/side dressing											
6) Earthing											
7) Weeding				19.5	38.5	750.8	1.70	833	1416	2166.9	
8) Spraying of agrochemical											
9) Irrigating											
10) Harvesting				3.0	38.5	115.5				115.5	
-Harvesting (z\$/kg)											
-Drying											
-Shelling				15.0	38.5	577.5				577.5	
-Hauling											
11) Miscellaneous											
bags, bale											
transport/bale											
2. Others											
Total			3605			1752			2290	7647	
3. Gross Income											
				Unit yield (kg/ha)		Unit Price		Gross Income			
				500		Z\$ 10.0 /kg		Z\$ 5000			
4. Net Income											
	Z\$			-2647 /ha							

表 3.2.4 事業を実施した場合の作物収支表 (1/9 : トウモロコシ)

(unit:kg,man-day, Z\$)

Particulars	Materials			Labor			Animal/Machine			Total Value	Remarks
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value		
1. Production Cost											
1) Land preparation											
-Plowing				0.8	38.5	31	1.6	546	874	905	
2) Nursery preparation											
3) Seeding											
-Seed preparation											
-Seeding	25	28.5	712.5	4.4	38.5	169				882	
4) Transplanting, if any											
5) Fertilizing											
-Basal Compound D	450	7.9	3555							3555	
-Top/side dressing											
1st Ammonium Nitrat	500	8.3	4150	2.0	38.5	77				4227	
6) Earthing											
7) Weeding				22.5	38.5	866	0.3	833	250	1116	
8) Spraying of agrochemical											
-Thiodan	4	402	1608	3.9	38.5	150				1758	
-(specify)											
-(specify)											
9) Water Charge/Irrigating	4	310	1240	12.0	38.5	462				1702	
10) Harvesting											
-Harvesting				10.0	38.5	385				385	
-Drying											
-Threshing				15.0	38.5	578				578	
-Hauling											
11) Miscellaneous Bags(piece)	100	7.8	780							780	
Bag transport	14	11.0	154							154	
2. Others											
3) Administration costs											
Total			12200			####			1124	16042	
3. Gross Income											
			Unit yield (ton/ha)			Unit Price			Gross Income		
			6.0			Z\$ 6.4 /kg			Z\$ 38400		
4. Net Income											
	Z\$	22358 /ha									

表 3.2.4 事業を実施した場合の作物収支表 (2/9 : 綿花)

(unit: kg, man-day,Z\$)

Particulars	Materials			Labor			Animal/Machine			Total Value	Remarks
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value		
1. Production Cost											
1) Land preparation											
-Plowing				0.8	38.5	31	1.6	546	874	905	Ox drawn
2) Nursery preparation											
3) Seeding											
-Seeding	25.0	16.7	418	3.0	38.5	115				533	
4) Transplanting, if any											
5) Fertilizing											
-Basal Compound L	250.0	13.1	3275	3.0	38.5	115				3390	
-Top/side dressing											
1st Ammonium Nitrate	100.0	8.3	830	1.5	38.5	58				888	
6) Earthing											
7) Weeding				30.0	38.5	1155	0.45	833	375	1530	
8) Spraying of agrochemical											
-Marshal(litre)	0.5	552.0	276	7.8	38.5	300				576	
-Carbryl	2.0	375.0	750	3.9	38.5	150				900	
-Synthetic Pyretheroid(litre)	1.0	619.0	619	3.9	38.5	150				769	
9) Water Charge/Irrigating	4.0	310.0	1240	16.0	38.50	616				1856	
10) Harvesting											
-Harvesting (z\$/kg)				2500	0.45	1125				1125	
11) Miscellaneous											
bags,bale	9.0	30.0	270							270	
transport/bale	14.0	160.0	2240							2240	
2. Others											
3) Administration costs											
Total			9918			3815			1249	14982	
3. Gross Income				Unit yield (ton/ha)		Unit Price				Gross Income	
				2.5		Z\$ 14.9 /kg				Z\$ 37250	
4. Net Income											
	Z\$		22268	/ha							

表 3.2.4 事業を実施した場合の作物収支表 (3/9 : ラッカセイ)

(unit: kg, man-day, Z\$)

Particulars	Materials			Labor			Animal/Machine			Total Value	Remarks
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value		
1. Production Cost											
1) Land preparation											
-Plowing				0.4	38.5	15	1.6	546	874	889	
-Harrowing				0.3	38.5	11				11	
-Seeding kg	100.0	35.0	3500	7.2	38.5	277				3777	
4) Transplanting, if any											
5) Fertilizing											
-Basal S.S.P	300.0	11.7	3510							3510	labor catered
-Top/side dressing 1st Gypsum	100.0	2.1	210	0.41	38.5	16				226	
6) Earthing											
7) Weeding				19.5	38.5	751	1.70	833	1416	2167	
8) Spraying of agrochemical											
-Innoculant bottle	2.0	10.0	20	3.9	38.5	150				170	
-Dimethoate litre	0.9	225.0	202	3.9	38.5	150				352	
-Thiran, 80WP bag	0.1	105.0	10	3.9	38.5	150				160	
9) Water Charge/Irrigating	4.0	310.0	1240	10.0	38.5	385				1625	
10) Harvesting											
-Harvesting (z\$/kg)				6.0	38.5	231				231	
-Drying											
-Shelling				29.0	38.5	1117				1117	
-Hauling											
11) Miscellaneous packing, bag	50.0	7.8	390							390	
transport	14.0	11.0	154							154	
2. Others											
3) Administration costs											
Total			9236			3253			2290	14779	
3. Gross Income				Unit yield (ton/ha)			Unit Price			Gross Income	
				2.5			Z\$ 10.0 /kg			Z\$ 25000	
4. Net Income	Z\$	10221 /ha									

表 3.2.4 事業を実施した場合の作物収支表 (4/9 : コムギ)

(unit: kg, man-day, Z\$)

Particulars	Materials			Labor			Animal/Machine			Total Value	Remarks
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value		
1. Production Cost											
1) Land preparation											
-Plowing				0.8	38.5	31	1.6	546	874	905	
2) Nursery preparation											
3) Seeding											
-Seed preparation											
-Seeding	130.0	18.0	2340	0.5	38.5	19				2359	
4) Transplanting, if any											
-Transplanting											
5) Fertilizing											
-Basal Compound D	550.0	7.9	4345	1.0	38.5	39				4384	
-Top/side dressing											
1st Ammonium nitrate	400.0	8.3	3320	0.5	38.5	19				3339	
Muriate of Potash	100.0	11.6	1160							1160	
6) Earthing											
7) Weeding				45.0	38.5	1733				1733	
8) Spraying of agrochemical											
-Demeton-S-Methyl 25EC	0.4	163.8	66	3.9	38.5	150				216	
-Aldrin	2.0	354.0	708	3.9	38.5	150				858	
9) Water Charge/Irrigating	4.0	310.0	1240	8.0	38.5	308				1548	
10) Harvesting											
-Harvesting (z\$/kg)				10.0	38.5	385				385	
-Threshing				12.0	38.5	462				462	
-Drying				10.0	38.5	385				385	
11) Miscellaneous											
packing, bag	42.0	7.8	328							328	
transport	1180	0.18	212							212	
2. Others											
3) Administration costs											
Total			13719			3681			874	18274	
3. Gross Income				Unit yield (ton/ha)		Unit Price				Gross Income	
				4.2		Z\$ 7.6 /kg				Z\$ 31920	
4. Net Income	Z\$		13646	/ha							

表 3.2.4 事業を実施した場合の作物収支表 (5/9 : トマト)

(unit: kg, man-day,Z\$)

Particulars	Materials			Labor			Animal/Machine			Total Value	Remarks
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value		
1. Production Cost											
1) Land preparation											
-Plowing				0.37	38.5	14	26.0	22.0	572	586	
-Harrowing				0.3	38.5	12	9.5	22.0	209	221	
2) Nursery preparation											
3) Seeding											
-Seed preparation											
-Seeding	0.15	5530	829							829	
4) Transplanting, if any											
-Transplanting				15.8	38.5	608	12.3	10.0	123	731	
5) Fertilizing											
-Basal	Compound S	800.0	12.8	10240	3.70	38.5	142	0.5	10.0	5	10387
	Pottasium sulphate	1000	17.7	17700							17700
	Lime	1000	2.1	2100							2100
-Top/side dressing											
1st	Ammonium nitrate	100.0	8.3	830	10.9	38.5	420	1.65	10.0	16	1266
	K2O										
6) Earthing											
7) Weeding											
				25.3	38.5	974				974	
8) Spraying of agrochemical											
-Mancozeb 80 WP		15.0	367.0	5505	7.8	38.5	300				5805
-Makathion 25WP		2.0	477.0	954	7.8	38.5	300				1254
-Carbaryl		0.8	375.0	300	7.8	38.5	300				600
9) Water Charge/Irrigating											
		6.0	310.0	1860	11.0	38.5	424	4.4	10.0	44	2328
10) Harvesting											
-Harvesting	(z\$/kg)				135	38.5	5198				5198
-Threshing											
-Drying											
11) Miscellaneous											
	packing, bag	42.0	11.0	462							462
	transport	75000	0.37	27750							27750
2. Others											
3) Administration costs											
Total			68530		8692		969	78191			
3. Gross Income											
			Unit yield (ton/ha)	75.0	Unit Price	Z\$ 3.8 /kg	Gross Income				
							Z\$ 285000				
4. Net Income											
Z\$		206809 /ha									

表 3.2.4 事業を実施した場合の作物収支表 (6/9 : キャベツ)

(unit: kg, man-day,Z\$)

Particulars	Materials			Labor			Animal/Machine			Total Value	Remarks
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value		
1. Production Cost											
1) Land preparation											
-Plowing				0.3	38.5	12	28.6	22.0	629	641	
-Harrowing				0.3	38.5	12	10.5	22.0	231	243	
2) Nursery preparation											
3) Seeding											
-Seed preparation											
-Seeding	0.45	1500	675	2.8	38.5	108				783	
4) Transplanting, if any											
-Transplanting				69.6	38.5	2680				2680	
5) Fertilizing											
-Basal Compound S	1000	12.80	12800	1.1	38.5	42	9.9	10.0	99	12941	
-Top/side dressing											
1st Ammonium nitrate	200.0	8.30	1660	8.9	38.5	343	1.65	10.0	16	2019	
6) Earthing											
7) Weeding				24.6	38.5	947				947	
8) Spraying of agrochemical											
-Mancozeb 80 WP	0.85	367	312	7.8	38.5	300				612	
-Dimethoate	2.5	225	562	7.8	38.5	300				862	
-Cosan WP	4.5	140	630	7.8	38.5	300				930	
9) Water Charge/Irrigating	10.0	310	3100	17.0	38.5	655				3755	
10) Harvesting											
-Harvesting (z\$/kg)				42.6	38.5	1640				1640	
11) Miscellaneous											
transport	50	600	30000							30000	
2. Others											
3) Administration costs											
Total			49739			7339			975	58053	
3. Gross Income											
			Unit yield (ton/ha)			Unit Price			Gross Income		
			50.0			Z\$ 3.0 /kg			Z\$ 150000		
4. Net Income											
Z\$			91947 /ha								

表 3.2.4 事業を実施した場合の作物収支表 (7/9 : 豆類)

(unit: kg, man-day,Z\$)

Particulars	Materials			Labor			Animal/Machine			Total Value	Remarks
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value		
1. Production Cost											
1) Land preparation											
-Plowing				0.8	38.5	31	1.6	546	874	905	
2) Nursery preparation											
3) Seeding											
-Seed preparation											
-Seeding	100	72.0	7200	4.5	38.5	173				7373	
4) Transplanting, if any											
5) Fertilizing											
-Basal Compound D	500	7.9	3950	2.0	38.5	77				4027	
-Top/side dressing											
1st Ammonium nitrate	100.0	8.3	830	2.0	38.5	77				907	
6) Earthing											
7) Weeding				22.5	38.5	866	0.3	833	250	1116	
8) Spraying of agrochemical											
-Carbyri 85WP	1.00	375.0	375	3.9	38.5	150				525	
-Malathion 50 EC	1.25	108.0	135	3.9	38.5	150				285	
-Benomyl 50WP	1.5	138.6	208	3.9	38.5	150				358	
-Dicofol, 25% WP	1.0	215.0	215	3.9	38.5	150				365	
9) Water Charge/Irrigating	4.0	310.0	1240	8.0	38.5	308				1548	
10) Harvesting											
-Harvesting (z\$/kg)				10.0	38.5	385				385	
-Threshing				10.0	38.5	385				385	
-Drying				2.0	38.5	77				77	
11) Miscellaneous transport to market	20	11.0	220							220	
bags	20	7.8	156							156	
2. Others											
3) Administration costs											
Total			14529			2979			1124	18632	
3. Gross Income				Unit yield (ton/ha)		Unit Price				Gross Income	
				2.0		Z\$ 20.0 /kg				Z\$ 40000	
4. Net Income	Z\$		21368	/ha							

表 3.2.4 事業を実施した場合の作物収支表 (8/9 : パプリカ)

(unit: kg, man-day,Z\$)

Particulars	Materials			Labor			Animal/Machine			Total Value	Remarks
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value		
1. Production Cost											
1) Land preparation											
-Plowing				0.8	38.5	31	1.6	546	874	905	
2) Nursery preparation											
3) Seeding											
-Seed preparation											
-Seeding	10.0	84.0	840	4.5	38.5	173				1013	
4) Transplanting, if any											
5) Fertilizing											
-Basal Compound D	750.0	7.9	5925	2.0	38.5	77				6002	
-Top/side dressing											
1st Ammonium nitrate	75.0	8.3	623	2.0	38.5	77				700	
2st Ammonium nitrate	75.0	8.3	623	4.0	38.5	154				777	
6) Earthing											
7) Weeding				22.5	38.5	866	0.3	833	250	1116	
8) Spraying of agrochemical											
-Carbyri 85WP	30.0	375.0	11250	3.9	38.5	150				11400	
-Dithane M4S	48.0	260.0	12480	3.9	38.5	150				12630	
9) Water Charge/Irrigating	4.0	310.0	1240	14.0	38.5	539				1779	
10) Harvesting											
-Harvesting (z\$/kg)				30.0	38.5	1155				1155	
-Threshing											
-Drying											
11) Miscellaneous transport to market	3.0	250.0	750							750	
bags	30.0	7.8	234							234	
2. Others marketing costs, 13% of gross income										11700	
1) Interests											
2) Tax											
3) Administration costs											
Total			33965			3372			1124	50161	
3. Gross Income				Unit yield (ton/ha)		Unit Price				Gross Income	
				3.0		Z\$ 30.0 /kg				Z\$ 90000	
4. Net Income	Z\$		39839	/ha							

表 3.2.4 事業を実施した場合の作物収支表 (9/9 : ベビーコーン)

Particulars	Materials			Labor			Animal/Machine			Total Value	Remarks
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value		
(unit:kg,man-day, Z\$)											
1. Production Cost											
1) Land preparation											
-Plowing				0.8	38.5	31	1.6	546	874	905	
2) Nursery preparation											
3) Seeding											
-Seed preparation											
-Seeding	40.0	151.0	6040	4.5	38.5	169				6209	
4) Transplanting, if any											
5) Fertilizing											
-Basal Compound D	600.0	7.9	4740							4740	
Manure											
-Top/side dressing											
1st Ammonium Nitrate	300.0	8.3	2490	2.0	38.5	77				2567	
Muriate of potash	50.0	11.6	580							580	
K2O											
6) Earthing											
7) Weeding				22.5	38.5	866	0.3	833	250	1116	
8) Spraying of agrochemical											
-Thiodan, 1%	14.0	402.0	5628	3.9	38.5	150				5778	
-Atrazin, litre	2.0	203.7	407	3.9	38.5	150				557	
-Lasso, litre	3.5	236.3	826	3.9	38.5	150				976	
9) Water Charge/Irrigating	3.2	310.0	992	12.0	38.5	462				1454	
10) Harvesting											
-Harvesting				10.0	38.5	385				385	
11) Miscellaneous											
Transport to market	1.0	250.0	250							250	
2. Others											
1) Marketing cost 10% of gross income										6000	
Total			21953			2440			1124	31517	
3. Gross Income	Unit yield (ton/ha)			Unit Price			Gross Income				
	1.0			Z\$ 60 /kg			Z\$ 60000				
4. Net Income	Z\$	28483 /ha									

表 3.2.5 農村道路改修計画

District	Type of Road (4 types)	Road length to be improved (km) and change of road type	Road length to be constructed (km)	No. of benefited household	No. of benefited population	Remarks
Kadoma	① Wide Tarred					
	② Narrow Tarred					
	③ Gravel or Earth		(156)	9,260	57,008	
	④ Track	97 km ④ to ③				
Gokwe North	① Wide Tarred					
	② Narrow Tarred					
	③ Gravel or Earth		(71)	4,346	27,018	
	④ Track	54 km ④ to ③				
Gokwe South	① Wide Tarred					
	② Narrow Tarred					
	③ Gravel or Earth		(69)	6,846	42,198	
	④ Track	98 km ④ to ③				
Kwekwe	① Wide Tarred					
	② Narrow Tarred					
	③ Gravel or Earth					
	④ Track	30 km ④ to ③		3,208	17,328	
Kadoma to Gokwe North						
Total		279 km	(**296)	23,650	143,542	
	Narrow Tarred					
	Gravel or Earth					

Note : ***296 km shows the length of operation/maintenance roads to be constructed along the proposed main irrigation canals. Accordingly, this road will be excluded from the road improvement plan under the rural infrastructure improvement plan for the whole study area.

表 3.2.6 飲料水施設整備計画

Ward Name	Farm Type	Nos. of Existing Boreholes ①	*Nos. of Boreholes to be Rehabilitated ① x 20 %	Population ②	Availability of Boreholes ③ = ②/④	**Recommended Nos. of Boreholes ④ = ②/250	Required Nos. of Boreholes ⑤ = ④ - ①	Remarks
Makore I (GN 11)	Communal	37	7	10,721	290	43	6	
Makore II (GN 12)	-do-	31	6	7,197	232	29	0	
Chisina I (GS 23)	-do-	36	7	17,251	479	69	33	
Chisina II (GS 24)	-do-	24	5	13,303	554	53	29	
Mabura (KW 6)	-do-	33	7	6,433	195	26	0	
Sidakeni (KW 7)	-do-	20	4	6,419	320	26	6	
Sanyati Communal (K20, K21, K22, K23 and K24)	-do-	156	31	45,404	293	183	27	
Sachuru (K28)	Resettlement	55	11	9,203	167	37	0	
Nyaurungwe, Gokwe District	-do-	(Not known)	-	4,819	-	19	-	
Muzveze I (K17)	-do-	50	12	8,829	150	35	0	
Total		(392)	(90)	120,981		520	(101)	

Note: 1) * Rehabilitation of boreholes: It mainly includes rehabilitation of hand pumps attached on the top of boreholes.

2) ** 250 persons per borehole proposed by NRWSSP (National Rural Water Supply and Sanitation Program).

3) Figures given in each column of the above Table were worked out using 1998 basis information.

4) Rehabilitation ratio of 20 % was used based on the field survey.

表 3.2.7 農業支援強化プログラムの概要 - 1/2

Program	Program Descriptions	Location, Target Area / Group, Program Requirements, Program Components	Responsible Agency
1. Establishment of Irrigated Agriculture Extension Centers (IAECs)			
1-1. Establishment of IAEC, Seke	<ul style="list-style-type: none"> - Establishment of IAEC in the proposed irrigated area of the dam, the right bank of the Munyati River - To establish a nucleus place for irrigated agricultural extension - To establish an office/place to accommodate field extension officers and a place for farmer training & meeting 	<p>In the proposed irrigated area of the Seke dam</p> <p><i>Components</i> IAEC Building (300 m²): 1 unit (4 office rooms, 1 lecture room, 1 lecture/meeting, 2 stores) Generator & electricity supply: 1 set Water supply facility: 1 set Training equipment: 1 set Office facilities & equipment: 1 set</p>	LMRBA
2. Adaptive Trials			
1-2. Establishment of IAEC, Nyarupakwe	<ul style="list-style-type: none"> - Establishment of IAEC in the Nyarupakwe Pilot Project Area by expanding AEC established under the Pilot Project, the left bank of the Munyati River - To establish a nucleus place for irrigated agricultural extension - To establish an office/place to accommodate field extension officers and a place for farmer training & meeting 	<p>In the irrigated area of the Nyarupakwe Pilot Project</p> <p><i>Components</i> IAEC Building (150 m²): 1 unit (1 office room, 1 lecture/meeting room, 1 store) Generator & electricity supply: 1 set Water supply facility: 1 set Training equipment: 1 set Office facilities & equipment: 1 set</p>	LMRBA
3. Extension Programs			
3-1. Field Programs	<ul style="list-style-type: none"> - Demonstration on: <ul style="list-style-type: none"> - New crops & variety - Recommended practices, fertilization etc. - Irrigation method & water management - Demonstration on water management at out-let committee block 	<p>Adaptive trials on variety, crops, cultivation method, irrigation methods, water management, range improvement etc. 1 trial site per 1,000 ha of irrigated areas To test field adaptability of technologies developed by research institutions & stations</p>	LMRBA/ DR&SS/ AGRITEX
Small-scale Demonstrations	<ul style="list-style-type: none"> Field crops: 1.0 ha Vegetables: 0.5 ha 	<p>1 trial site per 1,000 ha of irrigated areas Trial for 3 seasons Range improvement (1 ha): 1 trial site per ward; trial for 3 years</p>	LMRBA/ AGRITEX
Large-scale Demonstrations (25 ha)		<p>Selected farmer fields</p>	LMRBA/ AGRITEX

表 3.2.7 農業支援強化プログラムの概要 - 2/2

Program	Location,		Responsible Agency
	Target Area / Group, Program Requirements, Program Components	Program Components	
3. Extension Programs - continued 3-2. Farmer Training Programs	- Farmer training course on special subjects on farming practice water management, group dynamics & farmer organization, range management etc. (1 day/4 hours; 25 farmers/course) (3 days/12 hours; 25 farmers/course)	Representative of WUAs	LMRBA/ AGRITEX
3-3. Study Tour	- Study tour to advanced irrigation scheme & farming areas, marketing facilities etc.	Representative of WUAs	LMRBA/ AGRITEX
4. WUA/IMC Formation Guidance	- Supporting formation of WUA & IMC through - Awareness program - WUA/IMC formation guidance - Workshops for formation of WUA/IMC - "Learning by Doing" under Project Office support - Study tour of representatives of the WUA - To support formation and establishment of WUA & IMC at tertiary block level	Beneficiary groups of irrigation development (1 WUA/100ha) In total of 145 WUAs in communal & resettlement area <i>Components</i> Awareness program WUA/IMC formation guidance Workshop (1 day) Study tour	LMRBA/ AGRITEX
5. Farmer Organizations Formation Guidance	- Supporting strengthening/formation of farmers groups of the grazing area development pilot scheme	Beneficiary groups of 10 project related target wards (10 beneficiary groups) <i>Components</i> Awareness program Farmer to farmer guidance Strengthening guidance (1 day) Formation guidance Workshop (1 day)	LMRBA/ AGRITEX

Source: Program costs estimated based on current costs for similar programs implemented by AGRITEX

表 3.2.8 住民移転のシナリオ

Figure 3.2.8: Resettlement Scenarios	FSL dam res ht.	Number VIDCOs affected ¹	Number requiring resettl'm't (persons) ²	Negative impacts additional to resettlement requirements indicated in previous col (VIDCOs/HHs)	Positive impacts from potential employment ³
1. Full Buffer Zone extended natural and recreation area 2-3 km surrounding dam reservoir with limited access rights	950m	(8)	>3,500+ ⁴ [+100]	Grazing/watering losses: Ny, Ba, Ko, Ku, Mu, Ka (dam access loss), G; Vil.16	Mu, SiI
	940m	(8)	>3,500+ [+50]	Grazing/watering losses: Ny, Ba, Ko, Ku, Mu, Ka, Gw; Vil.16	Mu, SiI
2. Resettlement Scenario 1 with natural area creation 3 evacuated VIDCOs (Ba, Ku, Ko) normal access rights, minimal requirement for <i>ad hoc</i> compensation	950m	3	3,100 [+100]	Arable and gr. losses: ?Mu <10 HHs	Ny, Ch, Mu, SiI
	940m	3	3,100 [+50]	Arable and gr. losses: ?Mu ?5 HHs	Ny, Ch, Mu, SiI, Vil6
3. Resettlement Scenario 2 with minimal natural area creation 2 evacuated VIDCOs (Ba and Ku), normal access, additional <i>ad hoc</i> compensation	950m	2	2,250 [+100]	Arable and gr. losses: ?Mu ?<10 HHs Move/compensate: Ko ?10 HHs	Ko, Ny, Ch, Mu, SiI, Vil.16
	940m	2	2,250 [+50]	Arable losses: ?Mu ?5 HHs Move/compensate: Ko ?no HHs	Ko, Ny, (Ch), Mu, (SiI), Vil6
4. Restricted or Minimal Resettlement normal access and appropriate <i>ad hoc</i> compensation	950m	(2)	1,750 [+100]	(factored into resettlement requirement)	Ny, Ku Ch, Mu, SiI, Vil.16
	940m	(1)	750 [+50]	(factored into resettlement requirement)	Ny, (Ch), Mu, SiI, Vil6, Ny ⁵

¹ Affected VIDCOs are: Ba=Batanai, Ku=Kubatana, Ko=Koronika, Ny=Nyikyavatemala, Mu=Muchakata, Ka=Kasawi, Gw=Gwanzura, Vil.16=Muzvezve I (Ward 17).

² Ward population or in the case of "Restricted Resettlement" actual estimated numbers; figure below "[+(no.)]" is estimate for Ward 17, Kadoma.

³ Bold indicates more significant likely beneficiary VIDCO communities.

⁴ There will probably be an additional number from Muchakata.

⁵ Indicates land conceded by those resettled from Batanai.

表 3.3.1 クドゥ・ダム灌漑プロジェクト事業内容一覧表

Work Item	Description	Work Item	Description
I. Water Resources Development (Construction of Kudu Dam)		III. Livestock Development	
(1) Main Dam		(1) Water Trough (unit)	72
(a) Dam Type	Zoned Fill Dam	(2) Fully Fenced Gazing Blocks (block)	10
(b) Dam Height (m)	72.7		
(c) Dam Crest Length (m)	860.0	IV. Rural Infrastructure Improvement	
(d) Dam Crest Width (m)	8.0	(1) Rural Road Improvement (km)	279
(e) Embankment Volume (m ³)	7,003,000	(2) Borehole Improvement	
(2) Saddle Dam		(a) Rehabilitation (nos.)	90
(a) Dam Type	Zoned Fill Dam	(b) New Construction (nos.)	101
(b) Dam Height (m)	30.0	(3) Improvement of Communication System	L.S
(c) Dam Crest Length (m)	875.0		
(d) Dam Crest Width (m)	8.0	V. Agricultural Support Services Strengthening	
(e) Embankment Volume (m ³)	2,554,000	(1) Agricultural Extension Center (unit)	2
(3) Spillway		(2) Agricultural Support Services Program	L.S
(a) Design Flood Discharge			
- For Services Spillway (m ³ /s)	6,000	VI. Pilot Project	
- For Emergency Spillway (m ³ /s)	12,122	(1) Water Resources Development	} Details are shown in Table4.5.1
(b) Type of Spillway	Ungated Ogee Type	(2) Irrigation Development	
(c) Overflow Crest Length (m)	300.0	(3) Livestock Development	
(d) Overflow Depth (m)	6.12	(4) Rural Infrastructure Improvement	
(4) Outlet Works		(5) Institutional Strengthening	
(a) Type	Intake Tower	(6) Agricultural Support Services Strengthening	
(b) Outlet Capacity (m ³ /s)	31.5		
(c) Tunnel Diameter (m)	2.5		
(d) Tunnel Length (m)	560.0		
II. Irrigation Development			
(1) Irrigation Area (ha)	25,000		
- Communal & Resettlement Area (ha)	14,500		
- Small Scale Commercial Farm (ha)	6,000		
- Large Scale Commercial Farm (ha)	4,500		
(2) Main Irrigation Canal			
(a) Canal Type	Trapezoidal Concrete Lining Canal		
(b) Canal Length (km)	177.9		
(3) Secondary Irrigation Canal			
(a) Canal Type	Trapezoidal Concrete Lining Canal		
(b) Canal Length (km)	100.0		
(4) Related Structures			
(a) Diversion Structure (nos.)	363		
(b) Siphon (nos.)	3		
(c) Aqueduct (nos.)	25		
(d) Cross Drain (nos.)	317		
(e) Bridge (nos.)	39		
(f) Pump Station (nos.)	88		

表 3.3.2 事業費

Work Item	Work Q'ty		Amount(x1,000Z\$)	Remarks
I. Kudu Dam				
1. Stripping & Clearing	600,000	m ²	27,600	
2. Soft Excavation	2,520,600	m ³	428,502	
3. Hard Excavation	1,224,400	m ³	306,100	
4. Embankment	9,557,000	m ³	955,700	
5. Grouting	4,500	nos.	21,150	
6. Concrete	162,000	m ³	648,000	
7. Steel Work		L.S	3,020	
8. Miscellaneous			119,504	Σ(1-7)x5%
9. Engineering Services			376,436	Σ(1-8)x15%
10. Resettlement Cost		L.S	266,000	
11. Administration Expenses			157,601	Σ(1-10)x5%
12. Contingencies			330,961	Σ(1-11)x10%
T o t a l			3,640,574	
II. Irrigation and Drainage				
1. Main Irrigation Canal	178	km	1,275,000	
2. Seconadary Irrigation Canal	100	km	208,000	
3. Related Structures				
(a) Diversion Structure	363	nos.	115,000	
(b) Siphon	3	nos.	118,000	
(c) Aqueduct	25	nos.	510,000	
(d) Cross Drain	317	nos.	128,000	
(e) Bridge	39	nos.	28,000	
(f) Pump Station	88	nos.	400,000	
4. On-farm Facilities				
(a) Communal & Resettlement Area	14,500	ha	551,000	
(b) Small Scale Commercial Farm	6,000	ha	504,000	
(c) Large Scale Commercial Farm	4,500	ha	675,000	
5. Engineering & Administration			676,800	Σ(1-4)x15%
6. Contingencies			518,880	Σ(1-5)x10%
T o t a l			5,707,680	
III. Livestock				
1. Livestock Water Development Scheme		L.S	1,440	
2. Grazing Area Development Scheme		L.S	3,600	
3. Contingencies			504	Σ(1-2)x10%
T o t a l			5,544	
IV. Rural Infrastructure				
1. Road Improvement	279	km	106,020	
2. Construction and Improvement of Boreholes	191	nos.	110,960	
3. Improvement of Information Transmission Measures		L.S	9,120	
4. Engineering & Administration			33,915	Σ(1-3)x15%
5. Contingencies			26,002	Σ(1-4)x10%
T o t a l			286,017	
V. Agricultural Support Services				
1. Agricultural Extension Center	2	unit	11,020	
2. Extension Services		L.S	10,777	
T o t a l			21,797	
VI. Pilot Project				
1. Water Resources Development		L.S	118,862	
2. Irrigation Development		L.S	11,310	
3. Livestock Development		L.S	675	
4. Rural Infrastructure Development		L.S	63,650	
5. Institutional Strengthening			7,374	
5. Agricultural Support Services		L.S	1,807	
6. Engineering & Administration			30,552	Σ(1-5)x15%
7. Contingencies			23,423	Σ(1-6)x10%
T o t a l			257,653	
Grand Total			9,919,264	

表 3.4.1 作物收支

(At Financial Prices)

Crops	Without Project Conditions										With Project Conditions									
	Share to total area (a)	Cropped area (b)	Yield (c)	Total prod. (d)=(b)*©	Price Z\$/kg (e)	Total amount (f)=(d)*(e)	Prod. cost (g)	Total prod. cost (h)=(b)*(g)	Net return (i)=(f)-(h)	Share to total area (a)	Cropped area (b)	Yield (c)	Total prod. (d)=(b)*©	Price Z\$/kg (e)	Total amount (f)=(d)*(e)	Prod. cost (g)	Total prod. cost (h)=(b)*(g)	Net return (i)=(f)-(h)	Incremental net return (j)=(i)-(l)	
1 COTTON	0.52	13,000	0.60	7,800	14.90	116,220,000	6,732	87,516,000	28,704,000	0.700	17,500	2.50	43,750	14.90	651,875,000	14,982	262,185,000	389,690,000	390,986,000	
2 MAIZE	0.42	10,500	0.80	8,400	8.40	58,760,000	4,768	50,074,500	3,685,500	0.180	4,500	6.00	27,000	8.40	172,800,000	16,042	72,189,000	100,611,000	96,925,500	
3 WHEAT	0.00	0	0.00	0	7.60	0	0	0	0	0.630	15,750	4.20	66,150	7.60	502,740,000	18,274	287,815,500	214,924,500	214,924,500	
4 GROUNDNUTS	0.06	1,500	0.50	750	10.00	7,500,000	7,647	11,470,500	-3,970,500	0.050	1,250	2.50	3,125	10.00	31,250,000	14,779	18,473,750	12,776,250	16,748,750	
5 CABBAGE	0.00	0	0.00	0	3.00	0	0	0	0	0.035	875	50.00	43,750	3.00	131,250,000	58,053	50,796,375	80,453,625	80,453,625	
6 TOMATOES	0.00	0	0.00	0	3.80	0	0	0	0	0.035	875	75.00	65,625	3.80	249,375,000	78,191	68,417,125	180,957,875	180,957,875	
7 BABY CORN	0.00	0	0.00	0	60.00	0	0	0	0	0.035	875	1.00	875	60.00	52,500,000	31,517	27,577,375	24,922,625	24,922,625	
8 PAPRIKA	0.00	0	0.00	0	30.00	0	0	0	0	0.035	875	3.00	2,625	30.00	78,750,000	50,161	43,890,875	34,859,125	34,859,125	
Total	1.00	25,000	-	-	-	177,480,000	-	149,061,000	28,419,000	1.700	42,500	-	-	-	1,870,540,000	-	831,345,000	1,039,195,000	1,010,776,000	

Net Return	Incremental Net Return
Per ha Z\$	41,568
	40,431

(At Economic Prices)

Crops	Without Project Conditions										With Project Conditions									
	Share to total area (a)	Cropped area (b)	Yield (c)	Total prod. (d)=(b)*©	Price Z\$/kg (e)	Total amount (f)=(d)*(e)	Prod. cost (g)	Total prod. cost (h)=(b)*(g)	Net return (i)=(f)-(h)	Share to total area (a)	Cropped area (b)	Yield (c)	Total prod. (d)=(b)*©	Price Z\$/kg (e)	Total amount (f)=(d)*(e)	Prod. cost (g)	Total prod. cost (h)=(b)*(g)	Net return (i)=(f)-(h)	Incremental net return (j)=(i)-(l)	
1 COTTON	0.52	13,000	0.60	7,800	17.40	135,720,000	3,854	50,102,000	85,618,000	0.700	17,500	2.50	43,750	17.40	761,250,000	9,784	171,220,000	590,030,000	504,412,000	
2 MAIZE	0.42	10,500	0.80	8,400	7.50	63,000,000	2,724	28,602,000	34,398,000	0.180	4,500	6.00	27,000	7.50	202,500,000	11,439	51,475,500	151,024,500	116,626,500	
3 WHEAT	0.00	0	0.00	0	9.30	0	0	0	0	0.630	15,750	4.20	66,150	9.30	615,195,000	12,844	202,293,000	412,902,000	412,902,000	
4 GROUNDNUTS	0.06	1,500	0.50	750	9.30	6,975,000	4,232	6,348,000	627,000	0.050	1,250	2.50	3,125	9.30	29,062,500	9,567	11,988,750	17,103,750	16,476,750	
5 CABBAGE	0.00	0	0.00	0	2.80	0	0	0	0	0.035	875	50.00	43,750	2.80	122,500,000	40,104	35,091,000	87,409,000	87,409,000	
6 TOMATOES	0.00	0	0.00	0	3.50	0	0	0	0	0.035	875	75.00	65,625	3.50	239,687,500	55,481	48,545,875	181,141,625	181,141,625	
7 BABY CORN	0.00	0	0.00	0	55.80	0	0	0	0	0.035	875	1.00	875	55.80	48,825,000	23,764	20,793,500	28,031,500	28,031,500	
8 PAPRIKA	0.00	0	0.00	0	27.90	0	0	0	0	0.035	875	3.00	2,625	27.90	73,237,500	38,109	33,345,375	39,892,125	39,892,125	
Total	1.00	25,000	-	-	-	205,695,000	-	85,052,000	120,643,000	1.700	42,500	-	-	-	2,082,257,500	-	574,723,000	1,507,534,500	1,386,891,500	

Net Return	Incremental Net Return
Per ha Z\$	60,301
	55,476

表 3.4.2 経済費用及び便益フロー

(Unit:Z\$ 1000.0)

Year in Order	Year	Cost Stream				Benefit Stream	Net Benefit	Present Worth Value	
		Capital Cost	O&M	Replacement	Total			Discount Rate 10%	
								Cost	Benefit
1	2001	409846			409846	0	-409846	372587	0
2	2002	518922			518922	0	-518922	428861	0
3	2003	632912	7580		640492	0	-640492	481211	0
4	2004	994105	19494		1013599	6902	-1006697	692302	4714
5	2005	1168865	33506		1202371	7490	-1194881	746578	4651
6	2006	1184314	47718		1232032	7968	-1224064	695450	4498
7	2007	1274986	62997		1337983	8561	-1329422	686597	4393
8	2008	897860	73694		971554	186687	-784867	453237	87091
9	2009	449925	79129		529054	440853	-88201	224371	186965
10	2010	401954	83932		485886	618023	132137	187330	238275
11	2011	1724	83932		85656	796528	710870	30022	279178
12	2012		83932		83932	973697	889765	26743	310250
13	2013		83932		83932	1150868	1066936	24312	333365
14	2014		83932		83932	1328038	1244106	22102	349714
15	2015		83932		83932	1505156	1421224	20093	360322
16	2016		83932		83932	1505156	1421224	18266	327566
17	2017		83932		83932	1505156	1421224	16605	297787
18	2018		83932		83932	1505156	1421224	15096	270716
19	2019		83932		83932	1505156	1421224	13724	246105
20	2020		83932		83932	1505156	1421224	12476	223732
21	2021		83932	69943	153875	1505156	1351281	20793	203393
22	2022		83932		83932	1505156	1421224	10311	184902
23	2023		83932		83932	1505156	1421224	9373	168093
24	2024		83932		83932	1505156	1421224	8521	152812
25	2025		83932		83932	1505156	1421224	7747	138920
26	2026		83932		83932	1505156	1421224	7042	126291
27	2027		83932		83932	1505156	1421224	6402	114810
28	2028		83932		83932	1505156	1421224	5820	104373
29	2029		83932		83932	1505156	1421224	5291	94884
30	2030		83932		83932	1505156	1421224	4810	86258
31	2031		83932	69943	153875	1505156	1351281	8017	78417
32	2032		83932		83932	1505156	1421224	3975	71288
33	2033		83932		83932	1505156	1421224	3614	64807
34	2034		83932		83932	1505156	1421224	3285	58916
35	2035		83932		83932	1505156	1421224	2987	53560
36	2036		83932		83932	1505156	1421224	2715	48691
37	2037		83932		83932	1505156	1421224	2468	44264
38	2038		83932		83932	1505156	1421224	2244	40240
39	2039		83932		83932	1505156	1421224	2040	36582
40	2040		83932		83932	1505156	1421224	1854	33256
41	2041		83932	69943	153875	1505156	1351281	3091	30233
42	2042		83932		83932	1505156	1421224	1533	27485
43	2043		83932		83932	1505156	1421224	1393	24986
44	2044		83932		83932	1505156	1421224	1267	22715
45	2045		83932		83932	1505156	1421224	1151	20650
46	2046		83932		83932	1505156	1421224	1047	18772
47	2047		83932		83932	1505156	1421224	952	17066
48	2048		83932		83932	1505156	1421224	865	15514
49	2049		83932		83932	1505156	1421224	786	14104
50	2050		83932	69943	153875	1505156	1351281	1311	12822
		7935413	3765330	279772	11980515	59711229	47730714	5300668	5638421

EIRR 10.5%
 B/C 1.06 (Discount Rate10%)
 B-C 337753 (Discount Rate10%)

表 4.3.1 パイロット地区の人口

Village	Population	Village Area (km ²)	No. of Household	Population Density (Person/km)
1 Survey Area - A				
1) Marumbe	797	12.65	129	63.02
2) Muchina	637	11.00	103	57.87
3) Makarichi	466	18.35	79	25.40
4) Sekema	325	16.20	55	20.03
5) Muza	590	7.60	100	77.63
Sub-total/Average	2,815	65.80	466	42.78
2 Suvey Area - B				
1) Murandu	503	9.40	75	53.46
2) Magonyo	540	9.50	71	56.80
3) Hlamba	243	5.85	32	41.57
4) Jeffrey	415	15.70	62	26.46
Sub-total/Average	1,701	40.45	240	42.04
3 Survey Area - C *				
1) Komboni	166	5.70	23	29.05
2) Gunde	552	9.85	60	56.04
3) Mahvondo	631	6.35	77	99.43
4) Mabarani	745	15.45	81	48.23
5) Mujubeki	194	3.40	43	56.91
6) Mateuro	382	1.65	53	231.27
Sub-total/Average	2,669	42.40	337	62.96
Total/Average	7,185	148.65	1,043	48.34

Note: * - Survey Area - C is the area known to the Survey Team as a result of Stage II Survey's public hearing. They are indirectly affected villages in the downstream area.

表 4.3.2 パイロットプロジェクト地区の家畜飼養総数及び農家平均飼養頭数 1/, 2/

Items	Jeffrey, Mateuro, Gunde, Pilot									
	Hlamba	Magonyo	Murandu	Sekema	Makarichi	Muchina	Muhvondo	Mabarani	Mujubeki	Project Area
No. of Household	32	71	75	55	179	232	215	184		1,043
Average Holdings per Household										
- Cattle	9.3	3.4	3.5	3	3	7	5	4		4.6
- Goat	6.1	0.9	0.6	7	7	3	4	3		3.8
- Pig	1.1									-
- Donkey		0.1								-
Total Holdings per Household	16.5	4.4	4.1							8.4
LUs per Household	2.4	1.7	1.7	2.1	2.1	3.7	2.8	2.2		2.6
Total Holdings in Village										
- Cattle	140	227	247	165	537	1,624	1,075	736		4,751
- Goat	92	59	42	385	1,253	696	860	552		3,939
- Pig	17									
- Donkey		5								
Total Holdings in Village	249	291	289	550	1,790	2,320	1,935	1,288		8,712
LUs in Village	77.4	119.7	127.4	115.5	375.9	858.4	602.0	404.8		2,681

1/: Data on Hlamba, Magonyo & Murandu villages based on the livestock inventory survey by the JICA Study Team

2/: Data on other villages approximated by: No. of households x average holding size of livestock per household = total holding size in village

Source: the livestock inventory survey & the socio-economic environment survey by the JICA Study Team

表 4.3.3 農村住民の畜産開発ニーズ

Priority	Development Option	Villagers' Comments
High	Water Development	Water development is important for primary and secondary use in this semi-arid area.
	Grazing Area Development	Grazing schemes should be fenced in communal grazing area; important for improving grazing, crop protection, releasing labour for field work (relief from herding duties), providing animals for fattening schemes; important to find out more about veld rehabilitation and improvement; need a dam and means to reticulate water.
	Beef Fattening	For beef fattening, it is important to use home grown feed (grains and stovers) as there is an advantage in terms of cost compared to bought feed; should be done as a group so as to qualify for "free" transport to market (i.e. sell/transport more than 15 head each time as a group); probably fatten off veld rather than in pens, but both systems possible; would need credit for concentrate feed to mix with locally produced feed.
	Goat Fattening	Goat fattening is important as goats are relatively easy and cheap to keep, and would fatten especially male kids; fattening flock should be properly herded and housed or penned on a joint group basis; marketing needs to be developed; need male Boer goat to produce larger kids for fattening.
	Poultry Development (Broiler)	Mainly hybrid broilers; important to consider needs of women and youths; useful in providing food during harvest periods (in suitable quantities for feeding hired help) and in post-harvest periods (when people have a little money in their pockets); would need runs, feeding & watering trays, water and initial credit to buy stock (chicks) and concentrate to mix with home grown feed.
	Draft Power Improvement	Draft animal feeding is important and should be based on use of improved paddocking in grazing areas and crop residues and feeds; possible to develop fodder crops below Mahacha Dam, but would need information; would need fencing for grazing scheme.
Medium	Dairy Development	Dairy development is important as there is a general shortage of nutritious fresh milk in the area; could be done by first contributing to Gokwe Dairy Center, and, when electricity becomes available (scheduled for August 2000, but more likely to be in a few years time), then set up a local collection and processing point; would need credit to buy livestock and concentrate feed to mix with locally produced feed.
	Poultry Development (Layer)	Eggs should be produced mainly from hybrid layers; important to consider needs of women and youths.
	Pigs Development	Pigs are important as there is an unsatiated demand in the area; has the advantage of using cheaper home grown feeds (grains) and adding value; would need sties and credit to obtain stock and buy feed; consider both local and town markets.
	Fodder Development	Fodder development is unknown, but it is important to find out more as knowledge is limited; important to keep animals better; may be a high priority development if enough information is available.

表 4.3.4 パイロットプロジェクト地区の農民組織 -1/3: 村落内組織

Kraal (Village)	Name	Type of Organization 1/	Year of Establishment		Membership		Participation Rate(%) 2/	Function/Activities	Current Status of Activity	Remarks 3/
			1992	1994	Male	Female				
1. Marumbe	1. Scud Missile	S	1992		30	0	30	23 Football & entertainment	Active	
	2. Vanavevhu	A	1994		40	23	63	49 Farming & provision of loan	Active	
	3. Chitumbu Group Lending	A	1992		9	7	16	12 Lending group / provision of loan & mailing	Active	Organised by COTCO
2. Muchina	1. Muchina Burial Society	S	1984		7	4	11	11 Burial services & savings	Active	
	2. Arsenal Football Club	S	1993		23	0	23	22 Entertainment & farming	Active	
	3. Muchina Youth Group	A	1993		16	7	23	22 Farming	Active	
	4. Muchina Group Lending	A	1992		10	12	22	21 Lending group / provision of loan & mailing	Active	Organised by COTCO
	5. Simbanebadza Group	A	1992		12	4	16	16 Poultry & gardening	Active	
	6. Muchina Club	A (Women's Group)	1995		0	20	20	19 Gardening, poultry & sewing	Active	
	7. Muchina Farmers Club	A	1995					Association / purchasing of farm inputs	Active	Under S.W.A
3. Makarichi	1. Pepukai Burial Society	S	1999		8	8	16	20 Burial services & savings	Active	
	2. Murume Mukuru Football C.	S	1994		30	3	33	42 Football & entertainment	Active	
	3. Makarichi Group Lending	A	1991		15	0	15	19 Lending group / provision of loan & farming	Active	Organised by COTCO
	4. Kushinga Group	A	1992		12	17	29	37 Farming & sewing	Active	
	5. Tambanevhu Club	A	1992		30	23	53	67 Farming & provision of loan	Active	
	6. Murume Mukuru Club	A	1994		3	15	18	23 Farming & sewing	Active	
4. Sekena	1. B/H 28 Football Club	S	1998		22	0	22	40 Football & entertainment	Active	
	2. Badzaradisa	A	1996		21	6	27	49 Lending group / provision of loan & farming	Active	Organised by COTCO
5. Muza	1. Muza Income Generation G.	S	1998		2	11	13	13 Poultry, sewing, saving, gardening & pre-school	Active	
	2. Muza Lending Group	A	1992		10	7	17	17 Lending group / provision of loan & farming	Active	Organised by COTCO
	3. Chitendereno Group	A	1996		25	15	40	40 Farming & provision of loan	Active	
6. Murantu	1. Mahacha	A (Women's Group)	1999		0	18	18	24 Vegetable production/demonstration	Active	
	2. Murantu Group	A	1996		8	16	24	32 Lending group / provision of loan & farming	Active	Organised by COTCO
	3. Murantu Farmers Club	A						Association / purchasing of farm inputs	Active	Under S.W.A

Source: Survey on Socio-economic Environment & interview survey with FAEO

1/; S --- Organisation for social services; A --- Agricultural organisation

2/; Estimated figures: Total membership/No. of household in the village x 100

3/; Legal background for organisation or main institution supported formation; S. W. A. = Social Welfare Act, C. S. A. = Cooperatives Society Act

表 4.3.4 パイロットプロジェクト地区の農民組織-2/3: 村落内組織

Kraal (Village)	Name	Type of Organisation 1/	Year of Establishment	Membership		Participation Rate(%) 2/	Function/Activities	Current Status of Activity	Remarks 3/
				Male	Female				
7. Magonyo	1. Magonyo Group	A	1996	12	17	29	41 Lending group / provision of loan & farming	Active	Organised by COTCO
	2. Mahacha	A (Women's Group)	1999	0	28	28	39 Vegetable production/demonstration	Active	
8. Hlamba	1. Tongwe Club	A	1975	13	15	28	88 Livestock management	Active	
9. Jeffrey	1. Nyamacheni 80	A	1995	20	6	26	42 Lending group / provision of loan & farming	Active	Organised by COTCO
	2. Kwayedza	S (Women's Group)	1993	0	14	14	23 Saving club & cookery	Not Active	
10. Komboni	1. Matingvende	A	1998	1	1	2	9 Broiler production	Active	
	2. Kufuma Ishungu	A	1998	2	0	2	9 Buying & selling off layers	Active	
11. Gunde	1. Gunde Football Club	S	1991	100	0	100	167 Entertainment	Active	
	2. Nyarupakwe Bridge	S	1992	88	88	176	293 Construction of bridge	Active	
	3. Gunde Women's Club	S	1990	0	12	12	20 Sewing & knitting	Active	
	4. Batanai	S	1994	0	6	6	10 Group purchasing (women's group)	Active	
	5. Cut Cost Cooperative S.	S	1995	3	8	11	18 Cooperative / rural industry (sewing)	Active	
	6. Gunde	A	1995	5	0	5	8 Poultry production	Active	
	7. Gunde Gardens	A	1990	44	44	88	147 Lending group / provision of loan & farming	Active	
	8. Tavengwa AFC	A	1994	8	5	13	22 Farming & provision of loan	Active	
	9. Murandu Farmers Club	A					Association / purchasing of farm inputs	Active	Under S.W.A.
12. Mahvondo	1. Rufaro Poultry Club	A	1999	4	6	10	13 Broiler production	Active	
	2. Group 5	A	1996	25	6	31	40 Lending group / provision of loan & farming	Active	Organised by COTCO
	3. Kuronga	A (Women's Group)	1997	0	22	22	29 Gardening	Active	
13. Mabarani	1. Mabarani Group	A	1996	12	30	42	52 Lending group / provision of loan & farming	Active	Organised by COTCO
14. Mujubeki	1. Mujubeki Group	A	1997	10	20	30	70 Lending group / provision of loan & farming	Active	Organised by COTCO
15. Mateuro	1. Barika	A	1998	15	3	18	34 Lending group / provision of loan & farming	Active	Organised by COTCO
	2. Kupfamaishungu	A	1999	4	3	7	13 Broiler production	Active	
Total in Pilot Project Area				699	550	1,249	120		

Source: Survey on Socio-economic Environment & interview survey with FAEO

1/ S --- Organisation for social services; A --- Agricultural organisation

2/ Estimated figures: Total membership/No. of household in the village x 100

3/ Legal background for organisation or main institution supported formation; S. W. A. = Social Welfare Act, C. S. A. = Cooperatives Society Act

表 4.3.4 パイロットプロジェクト地区の農民組織 -3/3: 村落間組織

Kraal (Village) Inter-kraals	Name	Type of Organization 1/	Year of Establishment	Membership		Participation Rate(%) 2/	Function/Activities	Current Status of Activity	Remarks 3/
				Male	Female				
1.	Zvitirei Club	S	1959	5	32	37	Sewing, gardening, banking, singing, net ball & volley ball	Active	
2.	Tongve Disabled Cooperative Society	S	2000	8	2	10	Gardening, general dealer/store, bottle store & grinding mill	Active	
3.	Nyamacheni Bakery	S (Women's Group)	1996	0	51	51	Baking of bread & buns Sewing & knitting	Active	
4.	Umniati Producers Cooperative Society Ltd.	A	1961			865	Purchasing & marketing of farm products Farm inputs supply & coop. Shop	Active	Under C.S.A.
5.	Nyarupakwe Cattle Fattening	A	1982	50	3	53	Cattle fattening & marketing	Not Active	
6.	Nyamacheni Club/Cattle Fattening	A	1992	52	3	55	Cattle fattening, purchasing and marketing Provision of loan	Active	
7.	Nyarupakwe Good Farming Competition	A	1978	50	60	110	Farming competitions	Active	
8.	Tongve Young Farmers Club	A	1998	4	3	7	Provision of loan for farm equipment Group purchasing	Not Active	
9.	Nyamacheni Central	A	1991	40	36	76	Farming competitions & provision of loan	Active	
10.	Nyamacheni Good Farming Competition	A	1976	74	85	159	Farming competitions	Active	
11.	Nyamacheni Farmers Association (ZFU)	A	1984	85	15	100	Purchasing of farm inputs	Active	Under S.W.A.
12.	Nyamacheni Oil Seeds Group	A (Women's Group)	1995	0	85	85	Growing & selling of groundnuts	Active	
13.	Nyamacheni Master Farmers	A	1995	52	0	52	Farming & yolk making	Active	
14.	Nyamacheni Sorghum Group	A	1994	7	8	15	Sorghum production & selling to Chibuku	Active	
Total				427	383	1,675			

Source: Survey on Socio-economic Environment & interview survey with FAEO

1/ S --- Organisation for social services; A --- Agricultural organisation

2/ Estimated figures: Total membership/No. of household in the village x 100

3/ Legal background for organisation or main institution supported formation; S, W, A = Social Welfare Act, C, S, A = Cooperatives Society Act

表 4.3.5 パイロットプロジェクト地区におけるAGRITEXの普及システム

Items	Activities
1. Program Formulation	<p>FAEO: Preparation of Annual Program Plan (APP) for FAEO service area in early August through participatory approach (farmer-extension worker meeting)</p> <p>District Office: Preparation of District Annual Program Plan (APP) by reviewing APP prepared by FAEO in end of August</p> <p>Province Office: Preparation of Provincial Annual Program Plan (APP) by reviewing APP prepared by District Office (August/September)</p> <p>National: Preparation of National Annual Program Plan (APP) by reviewing APP prepared by Province Office (September)</p>
2. Implementation Schedule of APP	<p>District Office: Review of annual implementation schedule of District APP in December</p> <p>FAEO: Review of annual implementation schedule of APP in service area in December</p>
3. Extension System	<p>Approach: group/participatory approach; participatory planning of APP</p> <p>Service Area: ward/villages (12 - 19 villages)</p> <p>No. of Groups per FAEO: 24 farmer groups (2 - 4 groups/village)</p> <p>Ext. System: Participatory & change partner method</p> <p>MFT (target 10 farmers/FAEO/year)</p> <p>Field days/field guidance to groups (once a month in general)</p> <p>Distribution of extension materials/pamphlet</p> <p>Field demonstration</p> <p>Discussion, workshop on Annual Program Planning</p>
4. Master Farmer Training (MFT)	<p><u>Ordinary Master Farmer Training</u></p> <p>Target Group: Selected positive farmers Period: For 2 years</p> <p>Subjects: Crop, livestock, soil conservation, home management etc.</p> <p>Volume: 24 lessons in 2 years</p> <p>Test: 1st year --- performance tests of practices/fields/animals etc. 2nd year --- performance tests of practices/fields/animals etc.</p> <p>Certified: Certified as Ordinary Master Farmer by provincial AGRITEX staff for master farmer training</p> <p>Benefits: Priority in resettlement program & higher credit accessibility</p> <p><u>Advanced Master Farmer Training</u></p> <p>Target Group: Ordinary Master Farmer Period: For 1 year</p> <p>Subjects: Crop, livestock, soil conservation, home management etc.</p> <p>Volume: 24 lessons in 1 year</p> <p>Test: Written test at the end of training</p> <p>Certified: Certified as Advanced Master Farmer by provincial AGRITEX staff for master farmer training</p>
5. No. of Ordinary MFs	<p>District: No. of farmers qualified as MFs from 1994 to 1998 3,284 farmers (male 2,205 & female 1,079)</p>
6. Advanced MFs	<p>No advanced MFs in the Pilot Project Area</p>
7. Staff Training	<p><u>Compulsory & Optional Course</u></p> <p>Target Group: All AGRITEX staffs Period: 1-2 weeks, in general</p> <p>Subjects: Depending/on need basis Timing: Throughout the year</p> <p>Place: At head office or provincial office</p> <p><u>Refresher Course</u></p> <p>Target Group: Refresher training of AES/AEW Period: 1 day, in general</p> <p>Subjects: Depending/on need basis Place: At district office</p> <p>Timing: Throughout the year</p> <p>Frequency: Once/month(currently not being held)</p>

表 4.3.6 パイロットプロジェクト地区における普及サービスの裨益状況

Inquiry	AGRITEX	VET	ZFU	Agribank	COTCO
1. Farmers Understanding of Availability of Services (%)					
- Proportion of respondents know the availability	80	82	92	54	99
2. Past Experiences in Receiving Services (%)					
- Received Services Every Year	25	60	58	27	93
- Received Services 2 to 3 Times in Last 5 Years	6	10	2	3	1
- Received Services Once in Last 5 Years	9	5	5	7	0
- Never Received Services in Last 5 Years	60	25	45	63	6
	100	100	100	100	100

Source: Survey on Socio-economic Environment conducted by the JICA Study Team, Feb. - April, 2000

表 4.3.7 パイロットプロジェクト地区で実施されている主要農業信用サービスの貸付条件

Scheme & Types	Credit Institution	Interest/ Mark-up	Terms & Conditions	Performance 1/
Group Lending Credit Scheme - Group loan to small farmers	Agribank Gokwe Branch	62 % { 66 % per ann.	Loan Amount: No ceiling amount Loan Period: - Short term: < 12 months - Medium term: 2 - 5 years - Long term: 5 - 20 years Eligibility: Elder than 19 years old Not a defaulter Collateral: Basically not needed Other Conditions: Encouraging to include women in a group	Beneficiary in 1999 - 167 groups - 2,000 members Recovery Rate: 95 %
Group Lending Credit Scheme - Group loan to registered cotton growers, supplying farm inputs - Individual responsibility & not group guarantee system - When crop failure, rescheduled to next season	Rural Banking Office, Sanyati COTCO Gokwe Ginnery	25 % per season (mark-up)	Group: 20 - 50 cotton growers Loan Amount: Z\$5,000-12,000/ha Loan Period: about 6 months Eligibility: Registered as a cotton grower by COTCO More than 2 seasons of cotton cultivation Loan: Basically in kinds; seed, fertiliser, chemical, bail etc.	Beneficiary in 1999 - 103 groups - 1,452 members (male:1089/female:363) Beneficiary in 1999 - 150 groups Recovery Rate: 96 %
Credit Scheme - Credit scheme to members for purchasing farm inputs & farm implements etc.	Umnati Producers Coop. Society	17 % per season (mark-up)	Loan Period: about 6 months	Beneficiary in 1999 - 300 - 400 members

1/: Performance - performance in Gokwe South District

Source: Agribank Gokwe South Branch, COTCO Gokwe Ginnery & Umnati Producers Cooperative Society Ltd.

表 4.3.8 パイロット地区内外の農民組織

Name	Type / Features	Organised under / by "Social Welfare Act"	Related Agencies	Location/ Coverage	Established in	Membership		Functions/Activities /Performance in 1999 & etc.	
						Male	Female		Total
ZFU, Gokwe district office	- Union of farmers association - Apex organization of farmers association	"Social Welfare Act"	MOLA	Gokwe	1991	10,000	4,000	14,000 (membership in district)	- To support members in: - ensuring a better package - negotiating for producers prices - coordinating marketing facilities - coordinating transport arrangement - working for sales tax exemption - facilitating purchase of implement - providing technical services - Member fee: Z\$50/year
Chisina I Farmers Association	- Federation of farmers clubs at ward level - Federation of 16 clubs/villages	"Social Welfare Act"	MOLA	Nyarupakwe					
Marandu Farmers Club				Murandu					
Ganyungu Farmers Club	- Village level farmers association	"Social Welfare Act"	MOLA	Ganyungu					
Muchina Farmers Club	- Grass root level organization of ZFU			Muchina					
Urniani Producers Cooperatives Society Ltd.	Producers cooperatives Society	"Cooperatives Society Act" No. 6 of 1990	MNAECC	Nyarupakwe	1961	865			- Purchasing & marketing of cotton, maize, sunflower, livestock etc. - Supply of farm inputs - Provision of loan - Operation of cooperative shop - Tractor hiring/transportation services
Lending Groups in 12 Villages	Group of cotton growers registered & organised by COTCO for group loan services provided by the firm	by support of COTCO		12 villages in Project Area	1991 { 1998	167	130	297	- Organised for group loan scheme provided by COTCO - Supply of seed, fertiliser, chemical, bail basically in kinds - Individual responsibility - Delivery cotton at collection points
Women's Group - Muchina Club	- Group of women farmers		AGRITEX	Muchina	1995		20	20	Gardening, poultry & sewing group
- Mahacha	- Group of women farmers		AGRITEX	Murandu Magonyo	1999		46	46	Vegetable production (demonstration) group of 2 villages
- Kironga	- Group of women farmers		AGRITEX	Mahvondo	1997		22	22	Gardening group
- Nyamacheni Oil Seeds Group	- Group of women farmers		AGRITEX	Inter-kraals	1995		85	85	Production & selling of groundnut

Source: Interview with relevant institutions, extension staff & Survey on Socio-economic Environment

表 4.3.9 パイロット地区環境評価マトリックス

Phase	Location		Activities/Components and Effects	Potential Significance of Impact	Outcome: Environmental and social risk
Construction Period	Dam Wall (constr.)	Upstream	Borrow pit excavation	xx	low
			Replacement access road	x	low
			Earth moving /machinery use	x	low
			Construction camp	x	low
	Irrigation Scheme (constr.)	Downstream	Supply canal built	xx	low
			Road access improvements	*	low
			Social infrastructure	none/*	low
			Machinery use	x	low
			Labour camp	none	n.a.
	Implementation Process	Dam Wall and Reservoir (creation)	Upstream	Employment and income	**
Community health				x	low
Relocation and resettlement				none	n.a.
Tech'cal training and facilitation				*	low
Irrigation Area (development)		Downstream	Employment and income	*	low
			Environmental health	x	low
			Re-allocation of land	xx	medium
			Facilitation and farmer training	*	low
			Cultivated land loss	x	low
Project Operational Period	Dam and Reservoir	Upstream	Irrigation water supply	**	medium
			Urban water supply	none	n.a.
			New conservation area/habitat	**/xx	medium
			Local recreation area	*	low
			Fisheries development	*	medium
	Project Zone	Downstream	New livelihoods creation	*/**	low
			Agricultural production	**	low
			Improved access/infrastructure	none	n.a.
			Local business development	*	low
			Agri-chemicals/machinery use	x	low
			Landscape/env'ornmental change	x	low
			Communal Areas decongestion	none	n.a.
			Gender effects	?	low
			Traditional cultural impacts	?	low

Note: **Significance:** Refers to the potential magnitude of positive or negative impacts in relation to the receiving environment

Outcome: Refers to the risk of a negative eventuality despite mitigation attempts

Key: Potentially significant negative impacts
x (least), x, xx, xxx, xxxx, xxxxx (greatest)

Potentially significant positive impacts
* (least), **, ***, ****, ***** (greatest)

環境評価マトリックスの説明書

Construction Period

Dam wall construction – earth fill dam created built over duration 1.5 years

Borrow pit excavation: disruption and landscape impacts of transport and excavation of earth fill materials for construction

Access road creation: 1.5 km of replacement road on alternative alignment across dam wall

Earth moving/machinery use: siltation and erosion effects

Construction camp: building of (temporary) new housing and sanitation

Irrigation scheme -- construction of canal and irrigation system

Supply canal built: construction of water supply canal from dam to irrigation area

Road access improvements: improvements in access roads to irrigation area

Social infrastructure: improvements to centres, schools, clinics, bore holes

Machinery use: soil erosion risks during construction of irrigation system

Labour camp: any requirement of housing etc during construction

Implementation Process

Dam wall and reservoir creation – technical assistance and development process

Employment and Income: temporary employment for 100 villagers over construction period

Community health: possible spread of disease (malaria and STDs) between local and 20-25 skilled external workers, dangers relating to accidents and safety

Relocation and resettlement: none, some compensation for loss of cultivated land

Technical training and facilitation: beneficial “know how” spin-off from external assistance

Irrigation area development – technical assistance in development process

Employment and income: temporary job creation effects

Environmental health: possible disease spread effects, accidents and safety

Re-allocation of land: depends on policy and determination of government to subdivide irrigation plots to achieve new household livelihood units in line with resettlement project policy (1-2 ha irrigation in place of 4 ha existing in pilot project old settlement area)

Facilitation and farmer training: training and extension benefit

Project Operational Period

Dam and reservoir – new natural resource and change in environmental conditions

Irrigation water supply: maintenance of canal and assurance of water supply from catchment and dam reservoir through drought years

Urban water supply: not relevant

New conservation area/habitat: environmental values maintained

Local recreation area: community value of new resource

Fisheries development: productive and nutritional values

Project zone – agricultural development

New livelihoods creation: viable new household production units

Agricultural production: increased yields and assured production of higher value crops

Improved access infrastructure: road and communications improvements

Local business development: direct and indirect benefit to sustainable commercial and service support for local economy

Agri-chemicals/machinery use: water contamination, health and safety in handling chemicals and machinery

Landscape/environmental change: extent of vegetation cover and erosion protection

Communal Areas decongestion: indirect environmental benefit from relief on over-exploited land resources

Gender effects: indirect benefit to attitudes, empowerment of women

Traditional cultural impacts: loss of traditional values